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MILITARY WEAPON

No scientist of any major technical nation today views with any sense of ease the increasing imposition of Military Security. Science, like music, has been one free, international language, wherein the free exchange of ideas and understandings has been both a tradition and a necessity. Certainly the astronomer would be helpless if he could not use the geographical separation of two known points on the Earth's surface for his triangulation base in astronomical measurement. No power of the 200-inch telescope can make visible at Mount Palomar even the nearest of the stars—Alpha Centaurus.

It's been a fine, and a long tradition of free exchange of information—Man against the Ancient Blindness of ignorance. Man against Nature. The high, fine tradition that is right and necessary for Mankind.

The tradition has gone into total eclipse; the period of the eclipse is unpredictable, because the eclipse of the physical sciences results from the

failure of sociological engineering—a desperately necessary science that does not exist. The science of sociology developed to the engineering level, such that any competent sociologist can say “Do thus, thus, and this, and the following problems will be rectified, while the conflicts of your society will level out into co-operation,” and guarantee with ninety-nine plus per cent accuracy that it will invariably happen precisely as predicted. Any electronic engineer today can predict with that level of accuracy what will happen—that's why he's called an engineer instead of an experimenter.

Until sociological engineering *does* exist, we can't predict how long free science will remain in eclipse.

The difficulty is this: Nature will answer any question any scientist anywhere asks, for Nature has no respect for race, creed, politics, or any other human differentiation. Therefore, it has seemed on the surface, that secrecy in science was basically nonsense.

So it is—basically. But it is quite a trick to ask Nature just the right question, in just the right way. The greatest power in the Universe is not locked up in atoms—it's locked up in heads. Nature built the atoms, the whole of matter and radiation, seemingly, in one supernal catastrophic explosion. But then some two to three billions of years of development were required to build the immensely greater power of human thought.

Once, wars were determined by the strength of the men who fought; no man can struggle breast to breast with a sixty-ton tank. No man can hurl a stone with the force of a sixteen-inch rifle shell. The strength of man means nothing now—it is the mind of man that makes the immense, overwhelming strength of the machine.

Today, the military potential of a nation tends to be measured in terms of steel production, copper resources, manufacturing plant capacity—the measures of the Industrial Age.

Sorry—the measure is obsolete. Somewhat unaware, we have slipped from the Industrial Age to the Research Age; the true measure of the military potential of a nation today is its technical research capacity. A vast industrial capacity is essential to support a technical research structure; the technical research structure is the ultimate measure of military potential. Manpower no longer counts.

—Or does it? Men, not the physical strength of men, but the mental strength of men, counts as it always did.

Nature will always answer the questions asked; the brilliance of the mind that asks them is what counts. The questions asked, and the answers derived, are the ultimate military power of a nation today. These are the Primary Weapons—minds, keen, searching, brilliant minds. That there are great industrial plants near Detroit is no secret; the products of those plants, however, *are* secret, because they are directly and visibly military weapons.

That we have men with brilliant minds is no secret; the products of those minds, in a world under war tensions, are inevitably Primary Military Secrets. It is absolutely inescapable; the most powerful weapons will be kept secret in any military situation.

If the scientists dislike the situation, there remains one, and only one possible cure. It is pointless to rebel against security. It is thoroughly pointless to chant about the Traditions of Science. The traditions are dust, and the security is real for a real reason; we have no sociological engineering science that can destroy not the security, but the need for security.

THE EDITOR



DUMB WAITER

BY WALTER M. MILLER, JR.

A machine can be set to do almost anything—but it can only be expected to do as it's told. And that does not include taking the changed situation into account . . .

He came riding a battered bicycle down the bullet-scarred highway that wound among the hills, and he whistled a tortuous flight of the blues. Hot August sunlight glistened on his forehead and sparkled in the droplets that collected in his week's growth of blond beard. He wore faded khaki trousers and a ragged shirt, but his

clothing was no shabbier than that of the other occasional travelers on the road. His eyes were half-closed against the glare of the road, and his head swayed listlessly to the rhythm of the melancholy song. Distant artillery was rumbling gloomily, and there were black flecks of smoke in the northern sky. The young cyclist

DUMB WAITER

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watched with only casual interest.

The bombers came out of the east. The ram-jet fighters thundered upward from the outskirts of the city. They charged, spitting steel teeth and coughing rockets at the bombers. The sky snarled and slashed at itself. The bombers came on in waves, occasionally loosing an earthward trail of black smoke. The bombers leveled and opened their bays. The bays yawned down at the city. The bombers aimed. Releases clicked. No bombs fell. The bombers closed their bays and turned away to go home. The fighters followed them for a time, then returned to land. The big guns fell silent. And the sky began cleaning away the dusky smoke.

The young cyclist rode on toward the city, still whistling the blues. An occasional pedestrian had stopped to watch the battle.

"You'd think they'd learn someday," growled a chubby man at the side of the road. "You'd think they'd know they didn't drop anything. Don't they realize they're out of bombs?"

"They're only machines, Edward," said a plump lady who stood beside him. "How can they know?"

"Well, they're supposed to *think*. They're supposed to be able to learn."

The voices faded as he left them behind. Some of the wanderers who had been walking toward the city now turned around and walked the other way. Urbanophiles looked at the city

and became urbanophobes. Occasionally a wanderer who had gone all the way to the outskirts came trudging back. Occasionally a phobe stopped a phile and they talked. Usually the phile became a phobe and they both walked away together. As the young man moved on, the traffic became almost nonexistent. Several travelers warned him back, but he continued stubbornly. He had come a long way. He meant to return to the city. Permanently.

He met an old lady on top of a hill. She sat in an antique chair in the center of the highway, staring north. The chair was light and fragile, of handcarved cherrywood. A knitting bag lay in the road beside her. She was muttering softly to herself: "Crazy machines! War's over. Crazy machines! Can't quit fightin'. Somebody oughta—"

He cleared his throat softly as he pushed his bicycle up beside her. She looked at him sharply with haggard eyes, set in a seamy mask.

"Hi!" he called, grinning at her.

She studied him irritably for a moment. "Who're you, boy?"

"Name's Mitch Laskell, Grandmaw. Hop on behind. I'll give you a ride."

"Hm-m-m! I'm going t'other way. You will too, if y'got any sense."

Mitch shook his head firmly. "I've been going the other way too long. I'm going back, to stay."

"To the city? Haw! You're crazier

than them machines."

His face fell thoughtful. He kicked at the bike pedal and stared at the ground. "You're right, Grandmaw."

"Right?"

"Machines—they aren't crazy. It's just people."

"Go on!" she snorted. She popped her false teeth back in her mouth and chomped them in place. She hooked withered hands on her knees and pulled herself wearily erect. She hoisted the antique chair lightly to her shoulder and shuffled slowly away toward the south.

Mitch watched her, and marveled on the tenacity of life. Then he resumed his northward journey along the trash-littered road where motor vehicles no longer moved. But the gusts of wind brought faint traffic noises from the direction of the city, and he smiled. The sound was like music, a deep-throated whisper of the city's song.

There was a man watching his approach from the next hill. He sat on an apple crate by the side of the road, and a shotgun lay casually across his knees. He was a big, red-faced man, wearing a sweat-soaked undershirt, and his eyes were narrowed to slits in the sun. He peered fixedly at the approaching cyclist, then came slowly to his feet and stood as if blocking the way.

"Hi, fellow," he grunted.

Mitch stopped and gave him a

friendly nod while he mopped his face with a kerchief. But he eyed the shotgun suspiciously.

"If this is a stick-up—"

The big man laughed. "Naw, no heist. Just want to talk to you a minute. I'm Frank Ferris." He offered a burly paw.

"Mitch Laskell."

They shook hands gingerly and studied each other.

"Why you heading north, Laskell?"

"Going to the city."

"The planes are still fighting. You know that?"

"Yeah. I know they've run out of bombs; too."

"You know the city's still making the Geigers click?"

Mitch frowned irritably. "What is this? There can't be much radio-activity left. It's been three years since they scattered the dust. I'm not corn-fed, Ferris. The half-life of that dust is five months. It should be less than one per cent—"

The big man chuckled. "O.K., you win. But the city's not safe anyhow. The central computer's still at work."

"So what?"

"Ever think what would happen to a city if every ordinance was kept in force after the people cleared out?"

Mitch hesitated, then nodded. "I see. Thanks for the warning." He started away.

Frank Ferris caught the handle bars in a big hand. "Hold on!" he snapped. "I ain't finished talking."

The smaller man glanced at the shotgun and swallowed his anger. "Maybe your audience isn't interested, Buster," he said with quiet contempt.

"You will be. Just simmer down and listen!"

"I don't hear anything."

Ferris glowered at him. "I'm recruitin' for the Sugarton crowd, Laskell. We need good men."

"Count me out. I'm a wreck."

"Cut the cute stuff boy! This is serious. We've got two dozen men now. We need twice that many. When we get them, we'll go into the city and dynamite the computer installations. Then we can start cleaning it up."

"Dynamite? *Why?*" Mitch Laskell's face slowly gathered angry color.

"So people can live in it, of course! So we can search for food without having a dozen mechanical cops jump us when we break into a store."

"How much did Central cost?" Mitch asked stiffly. It was a rhetorical question.

Ferris shook his head irritably. "What does that matter now? Money's no good anyway. You can't sell Central for junk. Heh heh! Wake up, boy!"

The cyclist swallowed hard. A jaw muscle tightened in his cheek, but his voice came calmly.

"You help build Central, Ferris? You help design her?"

"Wh-why, no! What kind of a

question is that?"

"You know anything about her? What makes her work? How she's rigged to control all the subunits? You know that?"

"No, I—"

"You got any idea about how much sweat dripped on the drafting boards before they got her plans drawn? How many engineers slaved over her, and cursed her, and got drunk when their piece of the job was done?"

Ferris was sneering faintly. "You *know*, huh?"

"Yeah."

"Well that's all too bad, boy. But she's no good to anybody now. She's a hazard to life and limb. Why you can't go inside the city without—"

"She's a machine, Ferris. An intricate machine. You don't destroy a tool just because you're finished with it for a while."

They glared at each other in the hot sunlight.

"Listen, boy—people built Central. People got the right to wreck her, too."

"I don't care about rights," Mitch snapped. "I'm talking about what's sensible, sane. But nobody's got the right to be stupid."

Ferris stiffened. "Watch your tongue, smart boy."

"I didn't ask for this conversation."

Ferris released the handle bars. "Get off the bicycle," he grunted ominously.

"Why? You want to settle it the

hard way?"

"No. We're requisitioning your bicycle. You can walk from here on. The Sugarton crowd needs transportation. We need good men, but I guess you ain't one. Start walking."

Mitch hesitated briefly. Then he shrugged and dismounted on the side away from Ferris. The big man held the shotgun cradled lazily across one forearm. He watched Mitch with a mocking grin.

Mitch grasped the handle bars tightly and suddenly rammed the front wheel between Ferris' legs. The fender made a tearing sound. The shotgun exploded skyward as the big man fell back. He sat down screaming and doubling over. The gun clattered in the road. He groped for it with a frenzied hand. Mitch kicked him in the face, and a tooth slashed at his toe through the boot leather. Ferris fell aside, his mouth spitting blood and white fragments.

Mitch retrieved the shotgun and helped himself to a dozen shells from the other's pockets then mounted the bicycle and pedaled away. When he had gone half a mile, a rifle slug spanged off the pavement beside him. Looking back, he saw three tiny figures standing beside Ferris in the distance. The "Sugarton crowd" had come to take care of their own, no doubt. He pedaled hard to get out of range, but they wasted no more ammunition.

He realized uneasily that he might

meet them again, if they came to the city intending to sabotage Central. And Ferris wouldn't miss a chance to kill him, if the chance came. Mitch didn't believe he was really hurt, but he was badly humiliated. And for some time to come, he would dream of pleasant ways to murder Mitch Laskell.

Mitch no longer whistled as he rode along the deserted highway toward the sun-drenched skyline in the distance. To a man born and bred to the tune of mechanical thunder, amid vistas of concrete and steel, the skyline looked good—looked good even with several of the buildings twisted into ugly wreckage. It had been dusted in the radiological attack, but not badly bombed. Its defenses had been more than adequately provided for—which was understandable, since it was the capitol, and the legislators had appropriated freely.

It seemed unreasonable to him that Central was still working. Why hadn't some group of engineers made their way into the main power vaults to kill the circuits temporarily? Then he remembered that the vaults were self-defending, and that there were probably very few technicians left who knew how to handle the job. Technicians had a way of inhabiting industrial regions, and wars had a way of destroying those regions. Dirt farmers usually had the best survival value.

Mitch had been working with aircraft computers before he became displaced, but a city's Central Service Co-ordinator was a far cry from a robot pilot. Centrals weren't built all at once; they grew over a period of years. At first, small units were set up in power plants and water works to automatically regulate voltages and flows and circuit conditions. Small units replaced switchboards in telephone exchanges. Small computers measured traffic-flow and regulated lights and speed-limits accordingly. Small computers handled bookkeeping where large amounts of money were exchanged. A computer checked books in and out at the library, also assessing the fines. Computers operated the city buses, and eventually drove most of the routine traffic.

That was the way the city's Central Service grew. As more computers were assigned to various tasks, engineers were hired to co-ordinate them, to link them with special circuits and to set up central "data tanks," so that a traffic regulator in the north end would be aware of traffic conditions in the main thoroughfares to the south. Then, when the micro-learner relay was invented, the engineers built a central unit to be used in conjunction with the central "data tanks." With the learning units in operation, Central was able to perform most of the city's routine tasks without attention from human supervisors.

The system had worked well. Apparently, it was still working well three years after the inhabitants had fled before the chatter of the Geiger counters. In one sense, Ferris had been right: a city whose machines carried on as if nothing had happened—that city might be a dangerous place for a lone wanderer.

But dynamite certainly wasn't the answer, Mitch thought. Most of Man's machinery was already wrecked or lying idle. Humanity had waited a hundred thousand years before deciding to build a technological civilization. If he wrecked this one completely, he might never decide to build another.

Some men thought that a return to the soil was desirable. Some men tried to pin their guilt on the machines, to lay their own stupidity on the head of a mechanical scapegoat and absolve themselves with dynamite. But Mitch Laskell was a man who liked the feel of a wrench and a soldering iron—liked it better than the feel of even the most well balanced stone ax or wooden plow. And he liked the purr of a pint-sized nuclear engine much better than the braying of a harnessed jackass.

He was willing to kill Frank Ferris or any other man who sought to wreck what little remained. But gloom settled over him as he thought, "If everybody decides to tear it down, what can I do to stop it?" For that matter, would he then be right in trying to stop it.

At sundown he came to the limits of the city, and he stopped just short of the outskirts. Three blocks away a robot cop rolled about in the center of the intersection, rolled on tricycle wheels while he directed the thin trickle of traffic with candy-striped arms and with "eyes" that changed color like a stop-light. His body was like an oil drum, painted fire-engine red. The head, however, had been cast in a human mold, with a remarkably Irish face and a perpetual predatory smile. A short radar antenna grew from the center of his head, and the radar was his link with Central.

Mitch sat watching him with a nostalgic smile, even though he knew such cops might give him considerable trouble, once he entered the city. The "Skaters" were incapable of winking at petty violations of ordinance.

As the daylight faded, photronic cells notified Central, and the streetlights winked promptly on. A moment later, a car without a tail light whisked by the policeman's corner. A siren wailed in the policeman's belly. He skated away in hot pursuit, charging like a mechanical bull. The car screeched to a stop. "O'Reilly" wrote out a ticket and offered it to an empty back seat. When no one took it, the cop fed it into a slot in his belly, memorized the car's license number, and came clattering back to his intersection where the traffic had automatically begun obeying the or-

dinances governing non-policed intersections.

The cars were empty, computer-piloted. Their destinations were the same as when they had driven regular daily routes for human passengers: salesmen calling on regular customers, inspectors making their rounds, taxis prowling their assigned service-areas.

Mitch Laskell stood shivering. The city sounded sleepy but alive. The city moved and grumbled. But as far as he could see down the wide boulevard, no human figure was visible. The city was depopulated. There was a Geiger on a nearby lamp post. It clucked idly through a loud-speaker. But it indicated no danger. The city should be radiologically safe.

But after staring for a long time at the weirdly active streets, Mitch muttered, "It'll wait for tomorrow."

He turned onto a side road that led through a residential district just outside the city limits. Central's jurisdiction did not extend here, except for providing water and lights. He meant to spend the night in a deserted house, then enter the city at dawn.

Here and there, a light burned in one of the houses, indicating that he was not alone in his desire to return. But the pavement was scattered with rusty shrapnel, with fragments fallen from the sky battles that still continued. Even by streetlight, he could see that some of the roofs were damaged. Even though the bombers came without bombs, there was still



danger from falling debris and from fire. Most former city-dwellers who were still alive preferred to remain in the country.

Once he passed a house from which music floated softly into the street, and he paused to listen. The music was scratchy—a worn record. When the piece was finished, there was a moment of silence, and the player played it again—the last record on the

stack, repeating itself. Otherwise, the house was still.

Mitch frowned, sensing some kind of trouble. He wheeled the bicycle toward the curb, meaning to investigate.

"I live there," said a woman's voice from the shadows.

She had been standing under a tree that overhung the sidewalk, and she came slowly out into the street-light. She was a dark, slender girl



with haunted eyes, and she was holding a baby in her arms.

"Why don't you turn off your record player?" he asked. "Or change to the other side?"

"My husband's in there," she told him. "He's listening to it. He's been listening to it for a long time. His name is George. Why don't you go say hello to him?"

Mitch felt vaguely disturbed. There

was a peculiar note in the girl's quiet Spanish accent. Still, he wanted to talk to someone who had ventured into the city. He nodded and smiled at the girl.

"I'd like to."

"You just go on in. I'll stay out here. The baby needs fresh air."

He thanked her and strolled up on the porch. The record player stopped, tried to change, and played the same

piece again. Mitch knocked once. Hearing no answer, he entered and moved along the hallway toward the light in the kitchen. But suddenly he stopped.

The house smelled musty. And it smelled of something else. Many times he had smelled the syrup-and-stale-fish odor of death. He advanced another step toward the kitchen.

He saw a porcelain-topped table. He saw a hand lying across the table. The hand was bloated, and lying amid brown stains that also covered the forearm and sleeve. The hand had dropped a butcher knife.

Dead several days, he thought—and backed away.

He turned the record-player off as he left the house. The girl was standing at the curb gazing down at his bicycle. She glanced at him amiably and spoke.

"I'm glad you turned that record off, George. A man just came by and wanted to know why you played it so often. You must have been asleep."

Mitch started. He moistened his lips and stared at her wonderingly. "I'm not—" He fell silent for a moment, then stuttered. "You haven't been in the house?"

"Yes, but you were asleep in the kitchen. Did the man come talk to you?"

"Look, I'm not —" He choked and said nothing. The dark-eyed baby was eying him suspiciously. He lifted the bicycle and swung a long leg across

the saddle.

"George, where are you going?"

"Just for a little ride," he managed to gasp.

"On the man's bicycle?"

Something was twisting cruelly at his insides. He stared at the girl's wide brown eyes for a moment. And then he said it.

"Sure, it's all right. He's asleep—at the kitchen table."

Her mouth flickered open, and for an instant sanity threatened to return. She rocked dizzily. Then after a deep breath, she straightened.

"Don't be gone too long, George."

"I won't! Take good care of the baby."

He pedaled away on wings of fright. For a time he cursed himself, and then he fell to cursing the husband who had taken an easy road, leaving his wife to stumble alone. Mitch wondered if he should have stayed to help her. But there was nothing to be done for her, nothing at least that was in his power to do. Any gesture of help might become an irreparable blunder. At least she still had the child.

A few blocks away he found another house with an intact roof, and he prepared to spend the night. He wheeled the bicycle into the parlor and fumbled for the lights. They came on, revealing a dusty room and furniture with frayed upholstery. He made a brief tour of the house. It had been recently occupied, but there were still

unopened cans in the kitchen; and still crumpled sheets on the bed. He ate a cold supper, shaved, and prepared to retire. Tomorrow would be a dangerous day.

Sleep came slowly. Sleep was full of charging ram-jets in flak-scarred skies, full of tormented masses of people that swarmed in exodus from death-sickened cities. Sleep was full of babies wailing, and women crying in choking sobs. Sleep became white arms and soft caresses.

The wailing and sobbing had stopped. It was later. Was he awake? Or still asleep? He was warm, basking in a golden glow, steeped in quiet pleasure. Something—something was there, something that breathed.

“What—!”

“*Sshhh!*” purred a quiet voice. “Don’t say anything.”

Some of the warmth fled before a sudden shiver. He opened his eyes. The room was full of blackness. He shook his head dizzily and stuttered.

“*Sshhh!*” she whispered again.

“What is this?” he gasped. “How did you get—?”

“Be quiet, George. You’ll wake the baby.”

He sank back in utter bewilderment, with winter frosts gathering along his spine.

Night was dreamlike. And dawn came, washing the shadows with grayness. He opened his eyes briefly and went back to sleep. When he opened them again, sunlight was flooding the

room.

He sat up. *He was alone.* Of course! It had only been a dream.

He muttered irritably as he dressed. Then he wandered to the kitchen for breakfast.

Warm biscuits waiting in the oven! The table was set! There was a note on his plate. He read it, and slowly flushed.

There’s jam in the cupboard; and I hope you like the biscuits. I know he’s dead. Now I think I can go on alone. Thanks for the shotgun and the bicycle. Marta.

He bellowed a curse and charged into the parlor. The bike was gone. He darted to the bedroom. The shotgun was gone. He ran shouting to the porch, but the street was empty.

Sparrows fluttered about the eaves. The skyline of the business district lay lonesome in the morning sun. Squirrels were rustling in the branches of the trees. He looked at the weedy lawns where no children played, at the doors askew on their hinges, at a bit of aircraft wreckage jutting from the roof of a fire-gutted home—the rotting porches—the emptiness.

He rubbed his cheek ruefully. It was no world for a young mother and her baby. The baby would fit nicely in the bicycle’s basket. The shotgun would offer some protection against the human wolf-packs that prowled everywhere these days.

“Little thief!” he growled half-heartedly.

But when the human animal would

no longer steal to protect its offspring, then its prospects for survival would be bleak indeed. He shrugged gloomily and wandered back to the kitchen. He sat down and ate the expensive biscuits—and decided that George couldn't have cut his throat for culinary reasons. Marta was a good cook.

He entered the city on foot and unarmed, later in the morning.

He chose the alleyways, avoiding the thoroughfares where traffic purred, and where the robot cops enforced the letter of the law. At each corner, he paused to glance in both directions against possible mechanical observers before darting across the open street to the next alley. The Geigers on the lamp posts were clicking faster as he progressed deeper into the city, and twice he paused to inspect the readings of their integrating dials. The radioactivity was not yet dangerous, but it was higher than he had anticipated. Perhaps it had been dusted again after the exodus.

He stopped to prowl through an empty house and an empty garage. He came out with a flashlight, a box of tools, and a crowbar. He had no certain plan, but tools would be needed if he meant to call a temporary halt to Central's activities. It was dangerous to enter any building however; Central would call it burglary, unless the prowler could show legitimate reason for entering. He needed some kind of identification.

After an hour's search through several houses in the residential district, he found a billfold containing a union card and a pass to several restricted buildings in the downtown area. The billfold belonged to a Willie Jesser, an air-conditioning and refrigeration mechanic for the Howard Cooler Company. He pocketed it after a moment's hesitation. It might not be enough to satisfy Central, but for the time being, it would have to do.

By early afternoon he had reached the beginnings of the commercial area. Still he had seen no signs of human life. The thinly scattered traffic moved smoothly along the streets, carrying no passengers. Once he saw a group of robot climbers working high on a telephone pole. Some of the telephone cables carried the co-ordinating circuits for the city's network of computers. He detoured several blocks to avoid them, and wandered glumly on. He began to realize that he was wandering aimlessly.

The siren came suddenly from half a block away. Mitch stopped in the center of the street and glanced fearfully toward it. A robot cop was rolling toward him at twenty miles an hour! He broke into a run.

"You will halt, please!" croaked the cop's mechanical voice. "The pedestrian with the toolbox will please halt!"

Mitch stopped at the curb. Flight was impossible. The skater could whisk along at forty miles an hour if

he chose.

The cop's steel wheels screeched to a stop a yard away. The head nodded a polite but jerky greeting. Mitch stared at the creature's eyes, even though he knew the eyes were duds; the cop was seeing him by the heat waves from his bodily warmth, and touching him with a delicate aura of radar.

"You are charged with jay-walking, sir. I must present you with a summons. Your identification, please."

Mitch nervously produced the billfold and extracted the cards. The cop accepted them in a pair of tweezerlike fingers and instantly memorized the information.

"This is insufficient identification. Have you nothing else?"

"That's all I have with me. What's wrong with it?"

"The pass and the union card expired in 1987."

Mitch swallowed hard and said nothing. He had been afraid of this. Now he might be picked up for vagrancy.

"I shall consult Central Co-ordinator for instructions," croaked the cop. "One moment, please."

A dynamotor purred softly in the policeman's cylindrical body. Then Mitch heard the faint twittering of computer code as the cop's radio spoke to Central. There was a silence lasting several seconds. Then an answer twittered back. Still the cop said nothing. But he extracted a sum-

mons form from a pad, inserted it in a slot in his chassis, and made chomping sounds like a small typesetter. When he pulled the ticket out again, it was neatly printed with a summons for Willie Jesser to appear before Traffic Court on July 29, 1989. The charge was jay-walking.

Mitch accepted it with bewilderment. "I believe I have a right to ask for an explanation," he muttered.

The cop nodded crisply. "Central Service units are required to furnish explanations of decisions when such explanations are demanded."

"Then why did Central regard my identification as sufficient?"

"Pause for translation of Central's message," said the cop. He stood for a moment, making burring and clicking sounds. Then: "Referring to arrest of Willie Jesser by unit Six-Baker. Do not book for investigation. Previous investigations have revealed no identification papers dated later than May 1987 in the possession of any human pedestrian. Data based on one hundred sample cases: Tentative generalization by Central Service: it has become impossible for humans to produce satisfactory identification. Therefore, 'satisfactory identification' is temporarily redefined, pending instruction from authorized human legislative agency."

Mitch nodded thoughtfully. The decision indicated that Central was still capable of "learning," of gathering data and making generalizations

about it. But the difficulty was still apparent. She was allowed to act on such generalizations only in certain very minor matters. Although she might very well realize the situation in the city, she could do nothing about it without authority from an authorized agency. That agency was a department of the city government, currently nonexistent.

The cop croaked a courteous "Good day, sir!" and skated smoothly back to his intersection.

Mitch stared at his summons for a moment. The date was still four days away. If he weren't out of the city by then, he might find himself in the lockup, since he had no money to pay a fine.

Reassured now that his borrowed identity gave him a certain amount of safety, he began walking along the sidewalks instead of using the alleys. Still he knew that Central was observing him through a thousand eyes. Counters on every corner were set to record the passage of pedestrian traffic, and to relay the information to Central, thus helping to avoid congestion. But Mitch *was* the pedestrian traffic. And the counters clocked his passage. Since the data was available to the logic units, Central might make some unpleasant deductions about his presence in the city.

Brazenness, he decided, was probably the safest course to steer. He stopped at the next intersection and

called to another mechanical cop, requesting directions to City Hall.

But the cop paused before answering, paused to speak with Central, and Mitch suddenly regretted his question. The cop came skating slowly to the curb.

"Six blocks west and four blocks north, sir," croaked the cop. "Central requests the following information which you may refuse to furnish if you so desire: As a resident of the city, how is it that you do not know the way to City Hall, Mr. Jesser?"

Mitch whitened and stuttered nervously. "Why, I've been gone three years. I . . . I had forgotten."

The cop relayed the information, then nodded. "Central thanks you. Data has been recorded."

"Wait," Mitch muttered, "is there a direct contact with Central in City Hall?"

"Affirmative."

"I want to speak to Central. May I use it?"

The computer code twittered briefly. "Negative. You are not listed among the city's authorized computer personnel. Central suggests you use the Public Information Unit, also in City Hall, ground floor rotunda."

Grumbling to himself, Mitch wandered away. The P.I.U. was better than nothing, but if he had access to the direct service contact, perhaps, to some extent, he could have altered Central's rigid behavior pattern. The P.I.U. however would be well guarded.

A few minutes later he was standing in the center of the main lobby of the city hall. The great building had suffered some damage during an air raid, and one wing was charred by fire. But the rest of it was still alive with the rattle of machinery. A headless servo-secretary came rolling past him, carrying a trayful of pink envelopes. Delinquent utility bills, he guessed. Central would keep sending them out, but of course human authority would be needed to suspend service to the delinquent customers. The servo-secretary deposited the envelopes in a mailbox by the door, then rolled quickly back to its office.

Mitch looked around the gloomy rotunda. There was a desk at the far wall. Recessed in a panel behind the desk were a microphone, a loudspeaker, and the lens of a television camera. A sign hung over the desk, indicating that here was the place to complain about utility bills, garbage disposal service, taxes, and inaccurate weather forecasts. A citizen could also request any information contained in Central Data except information relating to defense or to police records.

Mitch crossed the rotunda and sat at the desk facing the panel. A light came on overhead. The speaker crackled for a moment.

"Your name, please?" it asked.

"Willie Jesser."

"What do you wish from Informa-

tion Service, please?"

"A direct contact with Central Data."

"You have a screened contact with Central Data. Unauthorized personnel are not permitted an unrestricted contact, for security reasons. Your contact must be monitored by this unit."

Mitch shrugged. It was as he had expected: Central Data was listening, and speaking, but the automatics of the P.I.U. would be censoring the exchange.

"All right," he grumbled. "Tell me this: Is Central aware that the city has been abandoned? That its population is gone?"

"Screening, screening, screening," said the unit. "Question relates to civil defense."

"Is Central aware that her services are now interfering with human interests?"

There was a brief pause. "Is this question in the nature of a complaint?"

"Yes," he grated acidly. "It's a complaint."

"About your utility services, Mr. Jesser?"

Mitch spat an angry curse. "About all services!" he bellowed. "Central has got to suspend all operations until new ordinances are fed into Data."

"That will be impossible, sir."

"Why?"

"There is no authorization from Department of City Services."

He slapped the desk and groaned.



"There is no such department now! There is no city government! The city is abandoned!"

The speaker was silent.

"Well?" he snapped.

"Screening," said the machine.

"Listen," he hissed. "Are you screening what I say, or are you just blocking Central's reply?"

There was a pause. "Your statements are being recorded in Central Data. Replies to certain questions must be blocked for security reasons."

"The war is over!"

"Screening."

"You're trying to maintain a civil status quo that went out of existence three years ago. Can't you use your logic units to correct for present conditions?"

"The degree of self-adjustment permitted to Central Service is limited by ordinance number—"

"Never mind!"

"Is there anything else?"

"Yes! What will you do when fifty men come marching in to dynamite the vaults and destroy Central Data?"

"Destroying city property is punishable by a fine of —"

Mitch cursed softly and listened to the voice reading the applicable ordinance.

"Well, they're planning to do it anyway," he snapped.

"Conspiracy to destroy city property is punishable by—"

Mitch stood up and walked away

ASTOUNDING SCIENCE-FICTION

in disgust. But he had taken perhaps ten steps when a pair of robot guards came skating out from their wall niches to intercept him.

"One moment, sir," they croaked in unison.

"Well?"

"Central wishes to question you in connection with the alleged conspiracy to destroy city property. You are free to refuse. However, if you refuse, and if such a conspiracy is shown to exist, you may be charged with complicity. Will you accompany us to Interrogation?"

A step closer to jail, he thought gloomily. But what was there to lose? He grunted assent and accompanied the skaters out the entrance, down an inclined ramp, and past a group of heavily barred windows. They entered the police court, where a booking computer clicked behind its desk. Several servo-secretaries and robot cops were waiting quietly for task assignments.

Mitch stopped suddenly. His escorts waited politely.

"Will you come with us, please?"

He stood staring around at the big room—at the various doorways, one leading to traffic court, and at the iron gate to the cell block.

"I hear a woman crying," he muttered.

The guards offered no comment.

"Is someone locked in a cell?"

"We are not permitted to answer."

"Suppose I wanted to go bail,"

he snapped. "I have a right to know."

"You may ask the booking desk whether a specific individual is being held. But generalized information cannot be released."

Mitch strode to the booking computer. "Are you holding a woman in jail?"

"Screening."

It was only a vague suspicion, but he said, "A woman named Marta."

"Full name, please."

"I don't know it. Can't you tell me?"

"Screening."

"Listen! I loaned my bicycle to a woman named Marta. If you have the bicycle, I want it!"

"License number, please."

"A 1987 license—number Six Zebra Five Zero."

"Check with Lost and Found, please."

Mitch controlled himself slowly. "Look—you check. I'll wait."

The computer paused. "A bicycle with that license number has been impounded. Can you produce proof of ownership?"

"On a bicycle? I knew the number. Isn't that enough?"

"Describe it please?"

Mitch described it wearily. He began to understand Ferris' desire to retire Central permanently and forcibly. At the moment, he longed to convert several sub-computers to scrap metal.

"Then," said the speaker, "if ve-

hicle is yours, you may have it by applying for a new license and paying the required fee."

"Refer that to Central Data," Mitch groaned.

The booking computer paused to confer with the Co-ordinator. "Decision stands, sir."

"But there aren't any new licenses!" he growled. "A while ago, Central said—Oh, never mind!"

"That decision applied to identification, sir. This applies to licensing of vehicles. Insufficient data has been gathered to permit generalization."

"Sure, sure. All right, what do I do to get the girl out of jail?"

There was another conference with the Co-ordinator, then: "She is being held for investigation. She may not be released for seventy-two hours."

Mitch dropped the toolbox that he had been carrying since morning. With a savage curse, he rammed the crowbar through a vent in the device's front panel, and slashed it about in the opening. There was a crash of shattering glass and a shower of sparks. Mitch yelped at the electric jolt and lurched away. Steel fingers clutched his wrists.

Five minutes later he was being led through the gate to the cell blocks, charged with maliciously destroying city property; and he cursed himself for a hot-tempered fool. They would hold him until a grand jury convened, which would probably be forever.

The girl's sobbing grew louder as he was led along the iron corridors toward a cell. He passed three cells and glanced inside. The cells were occupied by dead men's bones. *Why?* The rear wall was badly cracked, and bits of loose masonry were scattered on the floor. Had they died of concussion during an attack? Or been gassed to death?

They led him to the fifth cell and unlocked the door. Mitch stared inside and grinned. The rear wall had been partially wrecked by a bomb blast, and there was room to crawl through the opening to the street. The partition that separated the adjoining cell was also damaged, and he caught a glimpse of a white, frightened face peering through the hole. Marta.

He glanced at his captors. They were pushing him gently through the door. Evidently Central's talents did not extend to bricklaying, and she could not judge that the cell was less than escapeproof.

The door clanged shut behind him. "Marta," he called.

Her face had disappeared from the opening. There was no answer.

"Marta."

"Let me alone," grumbled a muffled voice.

"I'm not angry about the bicycle."

He walked to the hole and peered through the partition into the next cell. She crouched in a corner, peering at him with frightened, tear-reddened

eyes. He glanced at the opening in the rear wall.

"Why haven't you gone outside?" he asked.

She giggled hysterically. "Why don't you go look down?"

He stepped to the opening and glanced twenty feet down to a concrete sidewalk. He went back to stare at the girl.

"Where's your baby?"

"They took him away," she whimpered.

Mitch frowned and thought about it for a moment. "To the city nursery, probably—while you're in jail."

"They won't take care of him! They'll let him die!"

"Don't scream like that. He'll be all right."

"Robots don't give milk!"

"No, but there are such things as bottles, you know," he chuckled.

"Are there?" Her eyes were wide with horror. "And what will they put in the bottles?"

"Why—" He paused. Central certainly wasn't running any dairy farms.

"Wait'll they bring you a meal," she said. "You'll see."

"Meal?"

"Empty tray," she hissed. "Empty tray, empty paper cup, paper fork, clean paper napkin. No food."

Mitch swallowed hard. Central's logic was sometimes hard to see. The servo-attendants probably went through the motions of ladling stew from an empty pot and drawing cof-

fee from an empty urn. Of course, there weren't any truck farmers to keep the city supplied with produce.

"So that's why . . . the bones . . . in the other cells," he muttered.

"They'll starve us to death!"

"Don't scream so. We'll get out. All we need is something to climb down on."

"There isn't any bedding."

"There's our clothing. We can plait a rope. And if necessary, we can risk a jump."

She shook her head dully and stared at her hands. "It's no use. They'd catch us again."

Mitch sat down to think. There was bound to be a police arsenal somewhere in the building, probably in the basement. The robot cops were always unarmed. But, of course, there had been a human organization for investigation purposes, and to assume command in the event of violence. When one of the traffic units faced a threat, it could do nothing but try to handcuff the offender and call for human help. There were arms in the building somewhere, and a well-placed rifle shot could penetrate the thin sheet-steel bodies.

He deplored the thought of destroying any of the city's service machinery, but if it became necessary to wreck a few subunits, it would have to be done. He must somehow get access to the vaults where the central data tanks and the co-ordinators were located—get to them before

Ferris' gang came to wreck them completely so that they might be free to pick the city clean.

An hour later, he heard the cell block gate groan open, and he arose quickly. Interrogation, he thought. They were coming to question him about the plot to wreck Central. He paused to make a hasty decision, then scrambled for the narrow opening and clambered through it into the adjoining cell while the skater came rolling down the corridor.

The girl's eyes widened. "Wh-what are you—"

"*Shhh!*" he hissed. "This might work."

The skater halted before his cell while he crouched against the wall beyond the opening.

"Willie Jesser, please," the robot croaked.

There was a silence. He heard the door swing open. The robot rolled around inside his cell for a few seconds, repeating his name and brushing rubble aside to make way. If only he failed to look through the opening!

Suddenly a siren growled, and the robot went tearing down the corridor again. Mitch stole a quick glance. The robot had left the door ajar. He dragged the girl to her feet and snapped, "Let's go."

They squeezed through the hole and raced out into the corridor. The cell-block gate was closed. The girl moaned weakly. There was no place

to hide.

The door bolts were operated from remote boxes, placed in the corridor so as to be beyond the reach of the inmates. Mitch dragged the girl quickly toward another cell, opened the control panel, and threw the bolt. He closed the panel, leaving the bolt open. They slipped quickly inside the new cell, and he pulled the door quietly closed. The girl made a choking sound as she stumbled over the remains of a former inmate.

"Lie down in the corner," he hissed, "and keep still. They're coming back in force."

"What if they notice the bolt is open?"

"Then we're sunk. But they'll be busy down at our end of the hall. Now shut up."

They rolled under the steel cot and lay scarcely breathing. The robot was returning with others. The faint twitter of computer code echoed through the cell blocks. Then the skaters rushed past, and screeched to a stop before the escapee's cell. He heard them enter. He crawled to the door for a look, then pushed it open and stole outside.

He beckoned the girl to his side and whispered briefly. Then they darted down the corridor on tiptoe toward the investigators. They turned as he raced into view. He seized the bars and jerked the door shut. The bolt snapped in place as Marta tugged at the remote.

Three metal bodies crashed simultaneously against the door, and rebounded. One of them spun around three times before recovering.

"Release the lock, please."

Mitch grinned through the bars. "Why don't you try the hole in the wall?"

The robot who had spun crazily away from the door now turned. He went charging across the cell floor at full acceleration—and sailed out wildly into space.

An ear-splitting crash came from the street. Shattered metal skidded across pavement. A siren wailed, and brakes shrieked. The others went to look—and began twittering.

Then they turned. "You will surrender, please. We have summoned armed guards to seize you if you resist."

Mitch laughed and tugged at the whimpering girl.

"Wh-where—?"

"To the gate. Come on."

They raced swiftly along the corridor. And the gate was opening to admit the "armed guards." But, of course, no human bluecoats charged through. The girl muttered frightened bewilderment, and he explained on the run.

"Enforced habit pattern. Central has to do it, even when no guards are available."

Two repair units were at work on the damaged booking computer as

the escapees raced past. The repair units paused, twittered a notation to Central, then continued with their work.

Minutes later they found the arsenal, and the mechanical attendant had set out a pair of .45s for the "armed guards." Mitch caught one of them up and fired at the attendant's sheet-metal belly. The robot careened crazily against the wall, emitted a shower of blue sparks, and stood humming while the metal around the hole grew cherry red. There was a dull cough. The machine smoked and fell silent.

Mitch vaulted across the counter and caught a pair of submachine guns from the rack. But the girl backed away, shaking her head.

"I couldn't even use your shotgun," she panted.

He shrugged and laid it aside. "Carry as much ammunition as you can, then," he barked.

Alarm bells were clanging continuously as they raced out of the arsenal, and a loud-speaker was thundering a request for all human personnel to be alert and assist in their capture. Marta was staggering against him as they burst out of the building into the street. He pushed her back against the wall and fired a burst at two skaters who raced toward them down the sidewalk. One crashed into a fire plug; the other went over the curb and fell in the street.

"To the parking lot!" he called

over his shoulder.

But the girl had slumped in a heap on the sidewalk. He grumbled a curse and hurried to her side. She was semi-conscious, but her face was white and drawn. She shivered uncontrollably.

"What's wrong?" he snapped.

There was no answer. Fright had dazed her. Her lips moved, seemed to frame a soundless word: "George."

Muttering angrily, Mitch stuffed a fifty-round drum of ammunition in his belt, took another between his teeth, and lifted the girl over one shoulder. He turned in time to fire a one-handed burst at another skater. The burst went wide. But the skater stopped. Then the skater ran away.

He gasped, and stared after it. The blare of the loud-speaker was furnishing the answer.

"... All human personnel. Central patrol service has reached the limit of permissible subunit expenditure. Responsibility for capture no longer applied without further orders to expend subunits. Please instruct. Commissioner of Police, please instruct. Waiting. Waiting."

Mitch grinned. Carrying the girl, he stumbled toward a car on the parking lot. He dumped her in the back seat and started in behind her, but a loud-speaker in the front protested.

"Unauthorized personnel. This is Mayor Sarquist's car. Unauthorized personnel. Please use an extra."

Mitch looked around. There were no extras on the lot. And if there had

been one, it would refuse to carry him unless he could identify himself as authorized to use it.

Mayor Sarquist's car began twittering a radio protest to Central. Mitch climbed inside and wrenched loose the cable that fed the antenna. The loud-speaker began barking complaints about sabotage. Mitch found a toolbox under the back seat and removed several of the pilot-computer's panels. He tugged a wire loose, and the speaker ceased complaining. He ripped at another, and a bank of tubes went dead.

He drove away, using a set of dial controls for steering. The girl in the back seat began to recover her wits. She sat up and stared out the window at the thin traffic. The sun was sinking, and the great city was immersing itself in gloom.

"You're worthless!" he growled at Marta. "The world takes a poke at you, and you jump in your mental coffin and nail the lid shut. How do you expect to take care of your baby?"

She continued to stare gloomily out the window. She said nothing. The car screeched around a corner, narrowly missing a mechanical cop. The cop skated after them for three blocks, siren wailing; then it abandoned the chase.

"You're one of the machine-age's spoiled children," he fumed. "Technologists gave you everything you could possibly want. Push a button,

and you get it. Instead of taking part in the machine age, you let it wait on you. You spoiled yourself. When the machine age cracks up, you crack up, too. Because you never made yourself its master; you just let yourself be mechanically pampered."

She seemed not to hear him. He swung around another corner and pulled to the curb. They were in front of a three-story brick building set in the center of a green-lawned block and surrounded by a high iron fence. The girl stared at it for a moment, and raised her chin slowly from her fist.

"The city orphanage!" she cried suddenly, and bounded outside. She raced across the sidewalk and beat at the iron gate with her fists.

Mitch climbed out calmly and opened it for her. She darted up toward the porch, but a servo-attendant came rolling out to intercept her. Its handcuff-hand was open to grasp her wrist.

"Drop low!" he bellowed at her.

She crouched on the walkway, then rolled quickly aside on the lawn. A burst of machine-gun fire brightened the twilight. The robot spun crazily and stopped, hissing and sputtering. Wrecking a robot could be dangerous. If a bullet struck the tiny nuclear reactor just right, there would be an explosion.

They skirted wide around it and hurried into the building. Somewhere upstairs, a baby was crying. A servo-



nurse sat behind a desk in the hall, and she greeted them as if they were guests.

"Good evening, sir and madam. You wish to see one of the children?"

Marta started toward the stairs, but Mitch seized her arm. "No! Let *me* go up. It won't be pretty."

But she tore herself free with a snarl and bounded up the steps toward the cry of her child. Mitch shrugged to himself and waited. The robot nurse protested the illegal entry, but did nothing about it.

"*Noooo—!*"

A horrified shriek from the girl! He glanced up the staircase, knowing what was wrong, but unable to help her. A moment later, he heard her vomiting. He waited.

A few minutes later, she came staggering down the stairway, sobbing and clutching her baby tightly against her. She stared at Mitch with tear-drenched eyes; gave him a wild shake of her head, and babbled hysterically.

"Those cribs! They're full of little bones. Little bones—all over the floor. Little bones—"

"Shut up!" he snapped. "Be thankful yours is all right. Now let's get out of here."

After disposing of another robotic interferer, they reached the car, and Mitch drove rapidly toward the outskirts. The girl's sobbing ceased, and she purred a little unsung lullaby to her child, cuddling it as if it had just

returned from the dead. Remorse picked dully at Mitch's heart, for having growled at her. Motherwise, she was still a good animal, despite her lack of success in adjusting to the reality of a ruptured world.

"Marta—?"

"What?"

"You're not fit to take care of yourself."

He said it gently. She only stared at him as he piloted the car.

"You ought to find a big husky gal who wants a baby, and let her take care of it for you."

"No."

"It's just a suggestion. None of my business. You want your baby to live, don't you?"

"George promised he'd take care of us. George always took care of us."

"George killed himself."

She uttered a little whimper. "Why did he do it? Why? I went to look for food. I came back, and there he was. Why, *why?*"

"Possibly because he was just like you. What did he do—before the war?"

"Interior decorator. He was good, a real artist."

"Yeah."

"Why do you say it *that* way? He *was*."

"Was he qualified to live in a mechanical culture?"

"I don't know what you mean."

"I mean—could he control his slice of mechanical civilization, or did it

control him?"

"I don't see—"

"Was he a button-pusher and a switch-puller? Or did he care what made the buttons and switches work? Men misuse their tools because they don't understand the principles of the tools. A man who doesn't know how a watch works might try to fix it with a hammer. If the watch is communal property, he's got no right to fool with it. A nontechnologist has no right to take part in a technological civilization. He's a bull in a china shop. That's what happened to our era. Politicians were given powerful tools. They failed to understand the tools. They wrecked our culture with them."

"You'd have a scientist in the White House?"

"If all men were given a broad technical education, there could be nothing else there, could there?"

"Technocracy—"

"No. Simply a matter of education."

"People aren't smart enough."

"You mean they don't *care* enough. Any man above the level of a dullard has enough sense to grasp the principles of physics and basic engineering and mechanics. They just aren't motivated to grasp them. The brain is a tool, not a garbage can for oddments of information! Your baby there—he should learn the principles of logic and semantics before he's ten. He should be taught *how to use* the tool,

the brain. We've just begun to learn how to think. If the common man were trained in scientific reasoning methods, we'd solve our problems in a hurry."

"What has this got to do with us?"

"Everything. Your George folded up because he couldn't control his slice of civilization, and he couldn't live without it. He couldn't fix the broken toy, but he suffered from its loss. And you're in the same fix. I haven't decided yet whether you're crazy or just neurotic."

She gave him an icy stare. "Let me know when you figure it out."

They were leaving the city, driving out through the suburbs again into the night-shrouded residential areas. He drove by streetlight, for the car—accustomed to piloting itself by radar—had no headlights. Mitch thought gloomily that he had blundered. He had stalked into the city without a plan, and had accomplished nothing. He had alerted Central, and had managed to get himself classified as a criminal in the central data tanks. Instead of simplifying his task, he had made things harder for himself.

Whenever they passed a cop at an intersection, the cop retreated to the curb and called Central to inform the Co-ordinator of their position. But no attempt was made to arrest the fugitives. Having reached her limit of subunit expenditures, Central was relying on the nonexistent human police

force.

"Mayor Sarquist's house," the girl muttered suddenly.

"Huh? Where?"

"Just ahead. The big cut-stone house on the right—with part of the roof caved in."

Mitch twisted a dial in the heart of the pilot-computer, and the car screeched to a stop at the curb. The girl lurched forward.

"You woke the baby," she complained. "Why stop here? We're still in the city limits."

"I don't know," he murmured, staring thoughtfully at the dark hulk of the two-story mansion set in a nest of oaks. "Just sort of a hunch."

There was a long silence while Mitch chewed his lip and frowned at the house.

"I hear a telephone ringing," she said.

"Central calling Mayor Sarquist. You can't tell. It might have been ringing for three years."

She was looking out the rear window. "Mitch—?"

"Huh?"

"There's a cop at the intersection."

He seemed not to hear her. He opened the door. "Let's go inside. I want to look around. Bring the gun."

They strolled slowly up the walkway toward the damaged and deserted house. The wind was breathing in the oaks, and the porch creaked loudly beneath their feet. The door was still locked. Mitch kicked the glass out of

a window, and they slipped into an immense living room. He found the light.

"The cop'll hear that noise," she muttered, glancing at the broken glass.

The noisy clatter of the steel-wheeled skater answered her. The cop was coming to investigate. Mitch ignored the sound and began prowling through the house. The phone was still ringing, but he could not answer it without knowing Sarquist's personal identifying code.

The girl called suddenly from the library. "What's this thing, Mitch?"

"What thing?" he yelled.

"Typewriter keyboard, but no type. Just a bunch of wires and a screen."

His jaw fell agape. He trotted quickly toward the library.

"A direct channel to the data tanks!" he gasped, staring at the metal wall-panel with its encoders and the keyboard.

"What's it doing here?"

He thought about it briefly. "Must be. . . . I remember: just before the exodus, they gave Sarquist emergency powers in the defense setup. He could requisition whatever was needed for civil defense—draft workers for first aid, traffic direction, and so on. He had the power to draft anybody or anything during an air raid."

Mitch approached the keyboard slowly. He closed the main power switch, and the tubes came alive. He sat down and typed: *Central from Sarquist; You will completely clear the*

ordinance section of your data tanks and await revised ordinances. The entire city code is hereby repealed.

He waited. Nothing happened. There was no acknowledgment. The typed letters had not even appeared on the screen.

"Broken?" asked the girl.

"Maybe," Mitch grunted. "Maybe not. I think I-know."

The mechanical cop had lowered his retractable sprockets, climbed the porch steps, and was hammering at the door. "Mayor Sarquist, please!" he was calling. "Mayor Sarquist, please!"

"Let him rave," Mitch grunted, and looked around the library.

There was a mahogany desk, several easy-chairs, a solid wall of books, and a large safe in another wall. The safe—

"Sarquist should have some rather vital papers in there," he murmured.

"What do you want with papers?" the girl snapped. "Why don't we get out of the city while we can?"

He glanced at her coldly. "Like to go the rest of the way alone?"

She opened her mouth, closed it, and frowned. She was holding the tommy gun, and he saw it twitch slightly in her hand, as if reminding him that she didn't *have* to go alone.

He walked to the safe and idly spun the dial. "Locked," he muttered. "It'd take a good charge of T.N.T. . . . or—"

"Or what?"

"Central." He chuckled dryly. "Maybe she'll do it for us."

"Are-you crazy?"

"Sure. Go unlock the door. Let the policeman in."

"No!" she barked.

Mitch snorted impatiently. "All right then, I'll do it. Pitch me the gun."

"No!" She pointed it at him and backed away.

"Give me the gun!"

"No!"

She had laid the baby on the sofa where it was now sleeping peacefully. Mitch sat down beside it.

"Trust your aim?"

She caught her breath. Mitch lifted the child gently into his lap.

"Give me the gun."

"You wouldn't!"

"I'll give the kid back to the cops."

She whitened, and handed the weapon to him quickly. Mitch saw that the safety was on, laid the baby aside, and stood up.

"Don't look at me like that!" she said nervously.

He walked slowly toward her.

"Don't you dare *touch me!*"

He picked up a ruler from Sarquist's desk, then dived for her. A moment later she was stretched out across his lap, clawing at his legs and shrieking while he applied the ruler resoundingly. Then he dumped her on the rug, caught up the gun, and went to admit the insistent cop.

Man and machine stared at each

other across the threshold. The cop radioed a visual image of Mitch to Central, and got an immediate answer.

"Request you surrender immediately, sir."

"Am I now charged with breaking and entering?" he asked acidly.

"Affirmative."

"You planning to arrest me?"

Again the cop consulted Central.

"If you will leave the city at once, you will be granted safe passage."

Mitch lifted his brows. Here was a new twist. Central was doing some interpretation, some slight modification of ordinance. He grinned at the cop and shook his head.

"I locked Mayor Sarquist in the safe," he stated evenly.

The robot consulted Central. There was a long twittering of computer code. Then it said, "This is false information."

"Suit yourself, tin-boy. I don't care whether you believe it or not."

Again there was a twittering of code. Then: "Stand aside, please."

Mitch stepped out of the doorway. The subunit bounced over the threshold with the aid of the four-footed sprockets and clattered hurriedly toward the library. Mitch followed, grinning to himself. Despite Central's limitless "intelligence," she was as naive as a child.

He lounged in the doorway to watch the subunit fiddling with the dials of the safe. He motioned the girl down,

and she crouched low in a corner. The tumblers clicked. There was a dull snap. The door started to swing.

"Just a minute!" Mitch barked.

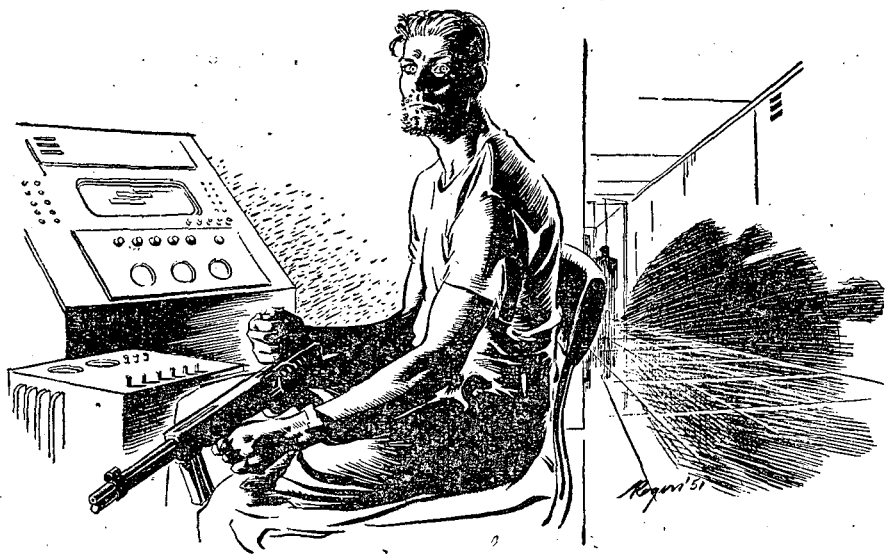
The subunit paused and turned. The machine gun exploded, and the brief hail of bullets tore off the robot's antenna. Mitch lowered the gun and grinned. The cop just stood there, unable to contact Central, unable to decide. Mitch crossed the room through the drifting plaster dust and rolled the robot aside. The girl whimpered her relief, and came up out of the corner.

The cop was twittering continually as it tried without success to contact the Co-ordinator. Mitch stared at it for a moment, then barked at the girl.

"Go find some tools. Search the garage, attic, basement. I want a screw driver, pliers, soldering iron, solder, whatever you can find."

She departed silently.

Mitch cleaned out the safe and dumped the heaps of papers, money, and securities on the desk. He began sorting them out. Among the various stacks of irrelevant records, he found a copy of the original specifications for the Central Co-ordinator vaults, dating from the time of installation. He found blueprints of the city's network of computer circuits, linking the subunits into one. His hands became excited as he shuffled through the stacks. Here was data. Here was substance for reasonable planning.



Heretofore, he had gone off half-cocked, and quite naturally had met with immediate failure. No one ever won a battle by being good, pure, or ethically right, despite Galahad's claims to the contrary. Victories were won by intelligent planning, and Mitch felt ashamed for his previous impulsiveness. To work out a scheme for redirecting Central's efforts would require time.

The girl brought a boxful of assorted small tools. She set them on the floor and sat down to glower at him.

"More cops outside now," she said. "Standing and waiting. The place is surrounded."

He ignored her. Sarquist's identifying code—it had to be here somewhere.

"I tell you, we should get out of here!" she whined.

"Shut up."

Mitch occasionally plucked a paper from the stack and laid it aside while the girl watched.

"What are those?" she asked.

"Messages he typed into the unit at various times."

"What good are *they*?"

He showed her one of the slips of yellowed paper. It said: *Unit 67-BJ is retired for repairs*. A number was scrawled in one corner: 5.00326.

"So?"

"That number. It was his identifying code at the time."

"You mean it's different every day?"

"More likely, it's different every

minute. The code is probably based on an equation whose independent variable is *time*, and whose dependent variable is the code number."

"How silly!"

"Not at all. It's just sort of a combination lock whose combination is continuously changing. All I've got to do is find the equation that describes the change. Then I can get to the Central Co-ordinator."

She paced restlessly while he continued the search. Half an hour later, he put his head in his hands and gazed despondently at the desk top. The key to the code was not there.

"What's the matter?" she asked.

"Sarquist. I figured he'd have to write it down somewhere. Evidently he memorized it. Or else his secretary did. I didn't figure a politician even had sense enough to substitute numbers in a simple equation."

The girl walked to the bookshelf and picked out a volume. She brought it to him silently. The title was "Higher Mathematics for Engineers and Physicists."

"So I was wrong," he grunted.

"Now what?"

He shuffled the slips of paper idly while he thought about it. "I've got eleven code numbers here, and the corresponding times when they were good. I might be able to find it empirically."

"I don't understand."

"Find an equation that gives the same eleven answers for the same

eleven times and use it to predict the code number for now."

"Will it work?"

He grinned. "There are an infinite number of equations that would give the same eleven answers for the same eleven substitutions. But it might work, if I assume that the code equation was of a simple form."

She paced restlessly while he worked at making a graph with time as the abscissa and the code numbers for ordinates. But the points were scattered across the page, and there was no connecting them with any simple sort of curve. "It almost has to be some kind of repeating function," he muttered, "something that Central could check by means of an irregular cam. The normal way for setting a code into a machine is to turn a cam by clock motor, and the height of the cam's rider is the code number for that instant."

He tried it on polar co-ordinates, hoping to get the shape of such a cam, but the resulting shape was too irregular to be possible, and he had no way of knowing the period of the repeating function.

"That's the craziest clock I ever saw," the girl murmured.

"What?" He looked up quickly.

"That electric wall clock. Five minutes ahead of the electric clock in the living room. But when we first came, it was twenty minutes ahead."

"It's stopped, maybe."

"Look at the second hand."

The red sweep was running. Mitch stared at it for a moment, then came slowly to his feet and walked to her side. He took the small clock down from its hook and turned it over in his hands. Then he traced the cord to the wall outlet. The plug was held in place by a bracket so that it could not be removed.

The sweep hand moved slowly, it seemed. Silently he removed the screws from the case and stared inside at the works. Then he grunted surprise. "First clock I ever saw with elliptical gears!"

"What?"

"Look at these two gears in the train. Ellipses, mounted at the foci. That's the story. For a while the clock will run faster than the other one. Then it'll run slower." He handled it with growing excitement. "That's *it*, Marta—the key. Central must have another clock just like this one. The amount of lead or lag—in minutes, is probably the code!"

He moved quickly to the direct contact unit. "Tell me the time on the other clock!"

She hurried into the living room and called back, "Ten seventeen and forty seconds . . . forty-five . . . fifty—"

The other clock was leading by five minutes and fifteen seconds. He typed 5.250 on the keyboard. Nothing happened.

"You sure that's right?" he called.

"It's now 10:18:10 . . . fifteen . . . twenty."

The clock was still slowing down. He tried 5.230, but again nothing happened. The unit refused to respond. He arose with an angry grunt and began prowling around the library. "There's something else," he muttered. "There must be a modifying factor. That clock's too obvious anyway. But what else could they be measuring together except time?"

"Is that another clock on his desk?"

"No, it's a barometer. It doesn't—"

He paused to grin. "Could be! The barometric pressure-difference from the mean could easily be mechanically added or subtracted from the reading of that wacky clock. Visualize this, inside of Central: The two clock motors mounted on the same shaft, with the distance between their indicator needles as the code number. Except that the distance is modified—by having a barometer rigged up to shift one of the clocks one way or the other on its axis when the pressure varies. It's simple enough."

She shook her head. Mitch took the barometer with him to the unit. The dial was calibrated in atmospheres, and the pressure was now 1.03. Surely, he thought, for simplicity's sake, there would be no other factor involved in the code. This way, Sarquist could have glanced at his watch and the wall clock and the barometer, and could have known the code number with only a little mental arithmetic.

The wall time minus the wrist time plus the barometer's reading.

He called to the girl again, and the lag was now a little over four minutes. He typed again. There was a sharp click as the relays worked. The screen came alive, fluttered with momentary phosphorescence, then revealed the numbers in glowing type.

"We've got it!" he yelled at Marta.

She came to sit down on the rug. "I still don't see what we've got."

"Watch!" He began typing hurriedly, and the message flashed neatly upon the screen.

CENTRAL FROM SARQUIST. CLEAR YOUR TANKS OF ALL ORDINANCE DATA, EXCEPT ORDINANCES PERTAINING TO RECORDING OF INFORMATION IN YOUR TANKS. PREPARE TO RECORD NEW DATA.

He pressed the answer button, and the screen went blank, but the reply was slow to come.

"It won't work!" Marta snorted. "It knows you aren't Sarquist. The subunits in the street have seen us."

"What do you mean by 'know', and what do you mean by 'see'? Central isn't human."

"It *knows* and it *sees*."

He nodded. "Provided you mean those words in a mechanical sense. Provided you don't imply that she *cares* what she knows and sees, except where she's required to 'care' by enforced behavior-patterns—ordi-

nances."

Then the reply began crawling across the screen, SARQUIST FROM CENTRAL. INCONSISTENT INSTRUCTIONS. ORDINANCE 36-J, PERTAINING TO THE RECORDING OF INFORMATION, STATES THAT ORDINANCE-DATA MAY NOT BE TOTALLY VOIDED BY YOU, EXCEPT DURING RED ALERT AIR WARNING.

"See?" the girl hissed.

DEFINE THE LIMITS OF MY AUTHORITY IN PRESENT CONDITIONS, he typed. MAY I TEMPORARILY SUSPEND SPECIFIC ORDINANCES?

YOU MAY SUSPEND SPECIFIC ORDINANCES FOR CAUSE, BUT THE CAUSE MUST BE RECORDED WITH THE ORDER OF SUSPENSION.

Mitch put on a gloating grin. READ ME THE SERIES NUMBERS OF ALL LAWS IN CRIMINAL AND TRAFFIC CODES.

The reaction was immediate. Numbers began flashing on the screen in rapid sequence. "Write these down!" he called to the girl.

A few moments later, the flashing numbers paused. WAIT, EMERGENCY INTERRUPTION, said the screen.

Mitch frowned. The girl glanced up from her notes. "What's—"

Then it came. A dull booming roar that rattled the windows and shook the house.

"Not another raid!" she whimpered.

"It doesn't sound like—"

Letters began splashing across the screen. **EMERGENCY ADVICE TO SARQUIST. MY CIVILIAN DEFENSE CO-ORDINATOR HAS BEEN DESTROYED. MY ANTI-AIRCRAFT CO-ORDINATOR HAS BEEN DESTROYED. ADVISE, PLEASE.**

"What happened?"

"Frank Ferris!" he barked suddenly. "The Sugarton crowd—with their dynamite! They got into the city."

CENTRAL FROM SARQUIST, he typed. WHERE ARE THE DAMAGED CO-ORDINATORS LOCATED?

UNDERGROUND VAULT AT MAP CO-ORDINATES K-81.

"Outside the city," he breathed. "They haven't got to the main tanks yet. We've got a little time."

PROCEED WITH THE ORDINANCE LISTING, he commanded.

Half-an-hour later, they were finished. Then he began the long task of relisting each ordinance number and typing after it: **REPEALED, CITY EVACUATED.**

"I hear gunshots," Marta interrupted. She went to the window to peer up and down the dimly lighted streets.

Mitch worked grimly. It would take them a couple of hours to get into the heart of the city, unless they

knew how to capture a robot vehicle and make it serve them. But with enough men and enough guns, they would wreck subunits until Central withdrew. Then they could walk freely into the heart of the city and wreck the main co-ordinators, with a consequent cessation of all city services. Then they would be free to pillage, to make a mechanical graveyard of the city that awaited the return of Man.

"They're coming down this street, I think," she called.

"Then turn out all the lights!" he snapped, and keep quiet.

"They'll see all the cops out in the street. They'll wonder why."

He worked frantically to get all the codes out of the machine before the Sugarton crowd came past. He was destroying its duties, its habit-patterns, its normal functions. When he was finished, it would stand helplessly by and let Ferris' gang wreak their havoc unless he could replace the voided ordinances with new, more practical ones.

"Aren't you finished yet?" she called. "They're a couple of blocks away. The cops have quit fighting, but the men are still shooting them."

"I'm finished now!" He began rattling the keyboard frantically.

SUPPLEMENTAL ORDINANCES: #1, THERE IS NO LIMIT OF SUBUNIT EXPENDITURE.

#2, YOU WILL NOT PHYSI-

CALLY INJURE ANY HUMAN BEING, EXCEPT IN DEFENSE OF CENTRAL CO-ORDINATOR UNITS.

#3, ALL MECHANICAL TRAFFIC WILL BE CLEARED FROM THE STREETS IMMEDIATELY.

#4, YOU WILL DEFEND CENTRAL CO-ORDINATORS AT ALL COSTS.

#5, THE HUMAN LISTED IN YOUR MEMORY UNITS UNDER THE NAME "WILLIE JESSER" WILL BE ALLOWED ACCESS TO CENTRAL DATA WITHOUT CHALLENGE.

#6, TO THE LIMIT OF YOUR ABILITY, YOU WILL SET YOUR OWN TASKS IN PURSUANCE OF THIS GOAL: TO KEEP THE CITY'S SERVICES INTACT AND IN GOOD REPAIR, READY FOR HUMAN USAGE.

#7, YOU WILL APPREHEND HUMANS ENGAGED IN ARSON, GRAND THEFT, OR PHYSICAL VIOLENCE, AND EJECT THEM SUMMARILY FROM THE CITY.

#8, YOU WILL OFFER YOUR SERVICE TO PROTECT THE PERSON OF WILLIE JESSER—

"They're here!" shouted the girl. "They're coming up the walk!"

... AND WILL ASSIST HIM IN THE TASK OF RENOVATING

THE CITY, TOGETHER WITH SUCH PERSONS WILLING TO HELP REBUILD.

The girl was shaking him. "They're here, I tell you!"

Mitch punched a button labeled "commit to data," and the screen went blank. He leaned back and grinned at her. There was a sound of shouting in the street, and someone was beating at the door.

Then the skaters came rolling in a tide of sound two blocks away. The shouting died, and there were several bursts of gunfire. But the skaters came on, and the shouting grew frantic.

She muttered: "Now we're in for it."

But Mitch just grinned at her and lit a cigarette. Fifty men couldn't stand for long against a couple of thousand subunits who now had no expenditure limit.

He typed one last instruction into the unit. WHEN THE PLUNDERERS ARE TAKEN PRISONER, OFFER THEM THIS CHOICE: STAY AND HELP REBUILD, OR KEEP AWAY FROM THE CITY.

From now on, there weren't going to be any nonparticipants.

Mitch closed down the unit and went out to watch the waning fight.

A bigger job was ahead.

THE END

SUICIDE'S GRAVE

BY JOSEPH PETKOFF

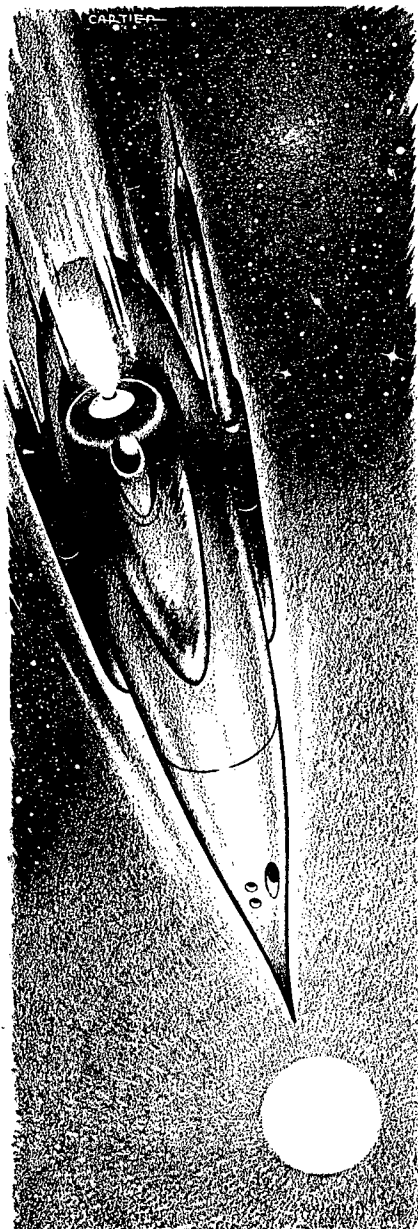
There is one way of gaining knowledge of mysterious phenomena that serves no purpose; suicide will lead to answers, no doubt—but under circumstances that yield no value!

Illustrated by Cartier

Hamilton merely smiled when he spotted the error on the timer dial. He was, he noted with a swift and thorough introspection, neither surprised nor displeased. He knew he subconsciously must have planned it that way, and that realization filled him, oddly enough, with a peaceful determination he could never have summoned for a more direct means of—

Suicide.

Or maybe, he thought, it was just



euthanasia. His work was done. And he'd left his wife of sixty years, his only real companion in a long, brilliant, lonely career, buried in the red dust of a nameless world thousands of light-years away.

His only real companion? Oh, no. There were the stars, the stars that had become a part of him—the stars of which he had become a part.

Hamilton's own research—the Eye of Terra had reported, years ago—is estimated to have established two-thirds of man's present information on stellar action and phenomena.

Now, homeward. To Sol—tiny, dim, fascinating Sol. His own first star, by far more than his Terran birthright, the star that had sent him in quest of knowledge of all the stars.

Two-thirds of his field. It was as much as could be asked of any man. And John Richard Hamilton was an old and lonely man.

That last inspection trip, that last remote station. There John Hamilton had collected his last set of data—the jealousy of his assistants, the knowledge that the institute was slipping from his grasp, his memories of how he'd felt at that age—sixty years ago.

He made his decision with a sudden rush of joy. He filed his resignation, carried it himself to the radio shack, ran to his ship to tell Anna it was all over, they were heading home. He found her dying.

And then he was alone with the stars, headed home in the lonely ship,

not to Earth but to Sol itself.

He must have been planning it days before he admitted it to himself. He knew when he stopped at the Centauri station that he had more than enough fuel to complete the voyage in the empty, silent, ship. He stopped and refueled. He'd been in too big a hurry to plan a normal flight, drop into real space at the rim of the Solar System and decelerate across to Earth. He had no reason to hurry. But he set the automatic pilot for an emergency course that would save him no more than a day—to drop into space near the orbit of Terra at a real velocity of zero.

Deliberately, he knew, he'd made that fatal transposition. As he set the drive timer, a 4 and a 6 had become a 6 and a 4. Now he would hurtle on through the blackness of nothing, the blackness of spacelessness, through the orbit of Earth and onward, until he fell into space.

He would fall into space in the heart of the sun. And John Richard Hamilton would be one with the stars, forever. Never, forever, lonely again.

He knew how the end would be: A grind of the drive as the timer cut out; a lurch, next, that he'd never feel. Every last gram of fuel would drain as the unthinkable mass of star-stuff the ship displaced was thrust into the hyperspace he'd just left. Unmeasurable radiation, impossible heat would engulf the whole fabric of the ship as the sun closed into the empty spot.

He'd hear the grind of the drive, and then nothing. Eternity, and his own private star, and nothing.

Panic struck his mind like the slash of a whip and he leaped toward the auto-pilot panel. Resolution returned as he touched the controls, and he shrugged, walked into the rear compartment and poured himself a drink with some silly tune humming through his mind. He almost laughed aloud as he recognized the air and sang, *sotto voce*:

*... An echo arose from his suicide's grave,
Oh, willow, tit-willow, tit-willow.*

Suddenly he felt the grind and his mind slowed to a halt, an empty reverie broken by a lurch he should never have sensed.

Stunned by surprise and wonder,

John Richard Hamilton saw and felt the dull red glow that crept first from the ports and then from the walls themselves; stunned, wondering, shocked, burning, the only man who had ever seen the interior of any star but something was horribly wrong. It wasn't really hot at all like it should be, just barely hot enough to kill a man. What was wrong with gravity? Why wasn't the ship crushed? Two-thirds of what man knew about the sun was a bunch of poppycock. How lonesome can a man ever be? Tit-willow, tit-willow—

John Richard Hamilton, whose own research had established two-thirds of man's misinformation on stellar action and phenomena, sat all alone, deep within the sun, and slowly, painfully, burned to death.

THE END

IN TIMES TO COME

Next month's lead yarn is "Blood's A Rover," by Chad Oliver. The yarn's an unusual one—and the cover van Dongen has done for it is as unusual as the yarn itself. I know a lot of you are going to have quite a time trying to make out just what the expression on that man's face is—and you'll find out only by reading the yarn. It's an expression only a man who'd experienced a lot more of the universe than any ordinary man contacts would feel or understand . . .

Also next issue is the result of my own recent visit to Brookhaven laboratories. The Atomic Energy Commission is spending a very large slice of your income and mine—you helped support them when you laid down your thirty-five cents for this magazine—and their work represents a major portion of the intellectual efforts of the nation. The work being done at Brookhaven is representative of the work of the Commission's laboratories across the nation. We're not a political magazine—but the distinction between politics and technology gets thin at the atomic level. They're doing quite a job at the A.E.C. labs . . .

THE EDITOR.

SUICIDE'S GRAVE

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THE FARTHEST HORIZON

BY RAYMOND F. JONES

There will be those who go up the sea of space in ships—and there will be the women who wait for them, too. And there will be the inevitable fights to keep the men from going, waged by women who fear the waiting.

It was meant to be a vacation. The three of them had looked forward to a week of joyous insanity. By letters—dozens of them—and by one long and recklessly expensive spacephone call they had planned this trip. Rick was coming home after a year-long exile on Mars.

Never again would they be separated so long, he had promised Sarah. But he had not told how he intended to keep that promise—not until he stepped off the spaceship dock and hugged her close while he punched the biceps of their sixteen-year-old Ken.

He told then about the great plans he had for all of them to live on Mars indefinitely. He told about the new space-probing crews of which he had been given command. And he told about the Junior Officers Corps, which came like a golden dream to Ken.

And so this that was meant for vacation time had turned to a harsh and bitter journey.

Sarah glanced aside at the face of Rick. Spaceburned, and grim now after their quarrels, he looked straight

ahead, his jaw tight. His hands gripped the steering wheel too hard, making the car sway like an overcontrolled ship.

In the edge of the rear-view mirror she could see Ken. It was like jumping backward two decades in time. But already there was the same intensity of eyes and hard-set jaw that made them alike in unapproachable severity.

A sudden scream cut through the air, far above. It seemed to hang like a vapor trail long after its source was gone.

Rick's face brightened. "What was that?" His eyes sought the sky for a brief instant, but saw nothing.

"Run 32 that Continental has been bragging about," said Ken. "They put it on two weeks ago and it's been making the Moon on a scheduled fourteen hours. It's really a ship! Shorty McComas, who handles mail, took me through her one night after hours."

Their faces were glowing in the intimacy of their private talk, which shut Sarah wholly out of their dread



world. The scream of the ship was to her a cry of pain and helplessness. To them it was a song of exultation.

"Let's hurry," she murmured to Rick. "We want to make it before dark."

Like a signal, her words shut the light of fascination out of their faces. She wanted to scream when they closed down like that. They challenged her right to interfere in their lives, but not once did they credit her with a life of her own.

It was almost dusk when they topped the long rise that looked over the valley where her parents lived. The sun was a golden light fanning out across the valley, and the scene brought a choked longing to her throat.

This is what I've wanted, she thought. This says everything I've tried to tell you about the way I feel.

Ken's voice was a sudden, small roar behind her. "Look at that sunset! It's like the flames of ten thousand jets rolled into one!"

Sarah looked away, helpless before the intuitive skill of Ken and Rick to turn everything into reminders of terror.

The farm of Sarah's father consisted of a thousand rolling acres devoted to orchards, grain, and cattle feeding. She had never lived on it, because her parents acquired it after their own retirement and long after her own marriage.

But the farm represented everything that she had come to think of as missing from her own life.

As long as she could remember, there had never been a time when she could put her personal possessions in a place she could call home—her own home. Her father was Commander Ronald Walker, United States Space Navy, Retired, and her early years had seen nothing but a succession of cell-like apartments near space bases, where she and her mother spent the long, lonely hours when the ships were out.

She felt almost cheated when her father retired and bought the farm. There was the peace and security and stability for which she had longed. And now it was still beyond her, for she, like her mother, had married a spaceman.

It was inevitable that she should. The only men she knew were spacemen. If it hadn't been for the Space Navy she and Rick would never have met. She had not yet come to the point of thinking it would have been best if they had not met. It wouldn't! But her heart ached with the weary questioning: Why couldn't their lives have been patterned in the same world?

She hated the very mention of the stars, and they were all that Rick and Ken lived for. It was all that her father had lived for. His frenzied rejection of Earth had left Sarah and her mother to years of loneliness while he chased a faraway dream that could

not be caught and held.

In retirement, he had given her mother finally the things she had longed for all her life. A home of her own—but Sarah pitied her mother for the long, wasted years, and the now fruitless achievement of her desire.

The car followed the swelling curve of the road over the hill and crossed a wooden bridge. The hollow rumbling of it was a solemn welcome to this rustic world. Ahead, the farm itself was deceptively casual in appearance. But Rick knew every building and every tree was laid out with the same precision Commander Walker would have used in planning a flight across the Solar System.

This, Sarah did not see or know. For her, this was simply peace in contrast to the hectic naval base where houses were boxes, and “entertainment” was planned in some department by a brisk young woman with owlsh glasses.

Sarah’s face softened now, and Rick, watching her, grew less grim. He stopped the car for a moment at the entrance to the farm. On either side, the glistening white fence curved away into the distance, along the green slopes, and was lost among the gentle hills. Overhead, the leaves held back the light of the sky and whispered temptingly to those who passed beneath.

Rick deflated his lungs with a long breath. “We ought to be able to find the answer to almost any problem in a

place like this,” he said. “Let’s make a try, Sarah. Will you forgive me the things I said this morning?”

“Of course—” Her voice held little conviction and drove him away with its utter resignation.

When he started the car again she wished she had taken advantage of the moment. If Rick could look at the farm through her eyes for just an instant—then perhaps they *could* find an answer to the questions that plagued them.

She looked askance at Ken in the back seat. He was puzzled and grim by the things he heard between them.

He wanted nothing from life except to be a spaceman. He lived only for the whine of the jets overhead, and the hours when he could get some porter or mechanic to take him through the vast ships.

At sixteen he had soloed at three times the speed of sound. He was cast in the mold of his father and his grandfather. And his handsome young face promised unhappiness for some other woman in the long, lonely waiting, Sarah thought.

Or perhaps there would be someone whose vision could soar along with his. There were enough such girls at the Base. Sarah envied their ability to watch the stars with burning light in their own eyes, waiting jubilantly for their men who spanned the chasms of space.

She would be forever apart from these, she knew. She did not know

why. She did not understand either herself or the men who were tied to her—but sometimes she wished for the courage to free them, wholly and completely.

The house was long and low, like a great crystal set among the trees. Sarah's mother came out the side door almost the moment the car drove up and erupted with Ken's sudden leap to the ground.

Mrs. Walker was still slim and looked fifteen years younger than her actual sixty-five. And all the harried tension that Sarah remembered so well was gone from her face.

She hugged Ken's man-wide shoulders and kissed his forehead as he struggled away.

"I think Dad's got something for you inside. He said something about your birthday, I believe."

"Wait a minute," called Sarah. "We got to see, too." She even felt that the smile on her face was real, now. She grasped Rick's hand and pulled him along as they left the car.

Then, as they stepped inside the house, the light in her face died away. Her father was standing there with his polished black pipe in one hand, and smiling across the room at Ken.

Reverently, the boy held a glistening three-foot model of an old-fashioned jet ship. It was a sleek, swept-back thing with a needle nose. Its bright red and gold coloring was like the flame of sunset.

Sarah felt sick inside. She recognized that shape and the golden name, *Mollie*, on the nose.

Mollie was her mother's name, and she knew that ship. She had seen its prototype when she was a lot younger than Ken was now. She had waited with her mother in a Navy radio room during a cold and rainy night, waited for news of that ship.

Her father was the pilot of it, flying the first round-the-world, non-refuel flight—the first of the atomic jets.

Ken was almost weak with the exquisite pleasure of this gift his grandfather had made for him.

"It . . . it's beautiful," he finally said. "Gosh, it's a beautiful thing. Boy, how I'd like to have been with you when you flew this—"

"You'll fly better ships than that one, son, and fly them farther and faster."

"But there'll never be a 'first' like this one."

"I think there will. I've been hearing about the Junior Patrol Corps that's being set up to train on Mars. I trust that your father has been able to swing enough influence to get you in. If he hasn't, I'm sure I have!"

Ken's angular face sobered. He set the model carefully on the floor and looked at it with his hands in his pockets.

"I won't be going, I believe," he said. "Mother doesn't think I'm old enough for that sort of thing. She doesn't want me to be a spaceman,

anyway."

Commander Walker glanced sharply and with new light in his eyes towards his daughter. He knew the expression he saw now on her face. So many times he had seen it—when she was a little girl and he said good-by to her at the beginning of some long flight.

"We'll have a talk about it," he said quietly, "but let's get ready for dinner now. Mother's had it waiting for half an hour. She'll really let us know about it if we keep her waiting much longer."

Ken slept that night with the model on end by his bed. The moonlight sprayed through the open window and softened the bright colors of the ship until it looked like a half-real dream standing there in take-off position.

But it would never be more than a dream for him, he thought. He couldn't hurt his mother as he knew he would do if he went to Mars. And there was more yet to think of. It would put a breach between his mother and father that could never be healed. He could not take the responsibility of that.

His perspective would not yet permit him to understand that the breach was already there and not of his creation. For the moment, he was imprisoned by his parents' conflict.

He watched the shadows slowly engulfing the ship as the moon rose higher. He could almost see and hear it crashing through the night sky

as his grandfather left the sun behind on that great flight around the world.

He had to go to Mars. He sat up in bed, his fist beating the pillow, his eyes suddenly wet. Somehow, he had to convince his mother that he and his father were not wrong.

Sarah awoke early, aware of the thin weight of another day. She wished now that they hadn't come. She had actually forgotten that the overwhelming influence of her father would be added to the other side of the argument and she knew she could no longer uphold her own.

She looked across at Rick's sleeping form, and suddenly their arguments seemed so futile. This was all there need be to life: a man, and a woman, and their child. What else mattered? Why couldn't Rick and Ken see that the stars did not matter as long as they had each other?

But, they would say, why couldn't she go along with them, if they wanted the stars bad enough? One side of the argument seemed as reasonable as the other, and she did not know the answer—only that she feared and hated the stars.

She took a quick, cold shower, and joined her mother in the kitchen of the farmhouse. Its broad windows opened onto the orchard, snowy with blossoms. In the meadow beyond, the grass was close-cropped by the indolent dairy cows.

Sarah stepped outside a moment

and filled her lungs with the sharp, glistening air. It carried the scent of the orchard and the dewy grass and the pungent smells of the distant barn where her father was supervising the milking.

"I don't see how anyone would want to live in any other way," she said. "It's horrible to bring up a child knowing nothing but grease and steel and the sickening smell of jets. Ken doesn't know what the world is like, yet!"

"If this is the world, then neither did any of us know it when we lived, at the bases when Dad was in the Navy!"

"We certainly didn't. Day and night—nothing but jets and rockets screaming. I thought I'd go crazy listening to them. I dreamed of finding a place where it was quiet and people moved at a walk instead of screaming through space like witches on atomic broomsticks."

"And then I saw to it that I would spend the rest of my life there by marrying a spaceman!"

"You don't have to stay with him."

"I do. It just so happens that I'm still in love with him. It's more likely that he'll tell me to go my own way, but I just can't stand the thought of Ken going to Mars to join this crazy Patrol they've organized for children. It's insane! Sixteen-year-olds being taught to handle spaceships. Don't they deserve *any* childhood?"

"What does Ken say about it?"

"He's all for it, of course. He doesn't know any better. He doesn't know there's anything else in the world."

Mrs. Walker checked the automatic ovens and glanced at the clock. "We'd better round up the men for breakfast. Almost done." Then she put her hands on her hips and looked at Sarah.

"I haven't had much to do with men—only had the one around during my life. With Ken and Rick you've had more experience in learning how they act, young and old, than I ever had. But one thing I did learn was that it just doesn't matter very much what they do as long as it's what they want. A man shouldn't have to slave at some uninspired career and try to enjoy life on the side. If his career isn't what he wants to do, then he's wasting his life, and no woman has a right to ask him to do that."

"Doesn't anything I want matter?"

"Of course. If you want to leave Rick and be a lady farmer nobody in the whole world would stop you or criticize you. That's one thing you can count on today—and that no one before us could—you are absolutely free to do just about as you please."

"You don't have to make it sound so ridiculous!"

"Well, what do you want, then? You don't want to go to Mars with Rick, and you don't want to stay behind."

"Why does a woman always have to be the one to give in?"

"They don't. I just told you what

you could do. You can break up your marriage and you and Rick and Ken can still be good friends—plenty of people have done that rather than ‘give in’ to each other.”

“But that’s the ancient dogma that I can’t have a marriage and my own life at the same time!”

“You’ve been married long enough to know that. You’ve hated the Navy life all these years, but you’ve lived it. Only this business of Ken’s going to Mars has brought it to a climax.

“I had to make the choice, too. It wasn’t much fun for me, sitting in the radio shack waiting for news of our great hero. I always thought it was nothing but showing-off, but it was the only thing he lived for, and of all the choices I had to make, he was the one thing I would not give up.

“Yours is twice as hard, because you have Ken as well as Rick—or is it twice as easy?”

In the afternoon she lay on the lawn chair in front of the house watching the twinkling pattern of sunlight that came through the leaves of the old oak tree. The world had stopped its rush of jet wings. She seemed to have slipped into utter timelessness.

Her father’s approach startled her out of her reverie.

“May I join you?” he said.

“If you promise to talk about nothing but cows and pigs, and crops and weather,” she said.

He dropped to the grass and looked

up at her. A patch of sunlight caught the silver border of his hair and turned the spaceburned skin of his face to bold bronze.

“I tried to interest Ken in the farm this morning,” he said, “but I didn’t have much luck. I’d be glad to leave him this place, you know, if he wanted it. I’ll be through with it by the time he’s old enough. But he won’t want it, and neither will Rick—not then, anyway. Farming these days is just an old man’s hobby, important enough, but my kind can take care of it.”

Sarah sighed. “All right, so you want to talk about Ken and Mars and space jets. You won’t let me hear of anything else. You’re all determined that I am wrong, that I haven’t the right to control my own child’s life until he knows what he wants to do.”

“Take it easy, Sarah. I’m not used to being jumped like that. It’s bad for an old man’s heart, you know.

“But as to Ken, are you sure that it’s his going to Mars that you are so angry about, or is it something that someone else has done to you—or something, even, that’s merely inside yourself?”

“It’s everything—everything connected with space and jets and the things that take men away from their families.”

“Rick tells me he’s arranged for you to go with him.”

“He’s arranged it! And without consulting me or even assuming I could have another idea about it. He’s been

gone a whole year, and now he expects to jerk me up and transplant me to some frigid desert where life isn't fit for savages. And I'm supposed to be happy about that!"

"Would you really be happy with anything less than his giving up space altogether?"

Her breathing halted momentarily with a quick, deep intake as if she had not dared to frame in words the magnitude of this demand before. But she nodded slowly. "I guess that's it, Dad. I'd really settle for nothing less."

"You'll have to settle for a lot less!" Commander Walker retorted. "It's always been like this, Sarah," he continued more gently.

"There has always been a peculiar breed of man who had to see just what was beyond the horizon, a kind of man never settled or satisfied with what he had in the here and now. That's the kind of man I am, and that's the kind Rick is—and Ken is one with us.

"There's nothing you can do about it, Sarah—nothing at all."

Sarah's face grew pale beneath the unwanted tan painted by sunlight on barren Naval Bases. "I can try," she said slowly.

"You'll lose them both."

"Would Mother have lost—?"

He nodded slowly. "There is no way on Earth to hold a man from crossing the private horizon he has to cross. And sometimes I think we all have such a horizon, whether we know it or not.

"At any rate, there were certain things I had to do. To have abandoned them would have hurt us both more than to follow through. Your mother understood that. She understood it very well."

"What about me? I didn't understand it. I don't understand it yet. What about the long nights I sat with mother listening for radio reports—first the solo flight around the world, then the Moon, and then the Mars trip, not once but three times we waited while you tried and failed and tried again.

"I was glad when you had to turn back and missed being the first to reach Mars. I felt it made up a little for all the nights I waited for you. But nothing, really, could make up for that. You didn't even care—"

"There's more to caring than just clinging to someone you love—sucking the life out of him with demands he cannot fulfill. You can't imprison the thing you love.

"Because I left you did not mean that I had forgotten you. Remembering you was the one thing that kept me going. Perhaps I've done nothing, really, to let you know that, but if I'd known you would ever say the thing you have just said I would have kept on going without caring much if I ever succeeded in getting back."

Sarah looked at her hands, lying still and icy in her lap. "I'm sorry, Dad—but that's the way I did feel. It's almost the way I feel now about



Rick and Ken. I can't help it. I can't forget those nights 'of waiting and being afraid—"

"Then you'd better tell Rick and get it over with. You can't change him, and you can't change Ken. Think about it a little while and then tell them if you still feel the same."

He rose to his feet and glanced off towards the distant fields. "I've got to go up to the house and check with the Weather Bureau again. I ordered two inches of rain for tonight and tomorrow. I'd like to postpone it while you're here, but the crops won't stand

it. It doesn't show much signs of developing yet. The forecasters are getting pretty careless about filling orders lately."

When he was gone, Sarah lay back in the chair, her arm over her eyes to shield them from the sun edging now through the maze of leaves. She would be glad to see it rain, she thought. It should be raining everywhere. The whole world should be crying.

She would have to tell Rick and Ken that they could go—forever.

There had not been any other answer since she first watched in fear while Rick took a new experimental ship to test on a long, lonely Moon flight. She had crouched then in a chair in the radio room just as she and her mother had done for so many long years waiting for news of her father.

There had been a thousand other flights since then, and they had quarreled and made up and quarreled bitterly again. And he had wholly overruled her objections to Ken's taking the jet courses at the Base.

Now, he wanted to take them to Mars forever. That, she could not do. They had to cross their far horizons wherever they might lead them, but they had to go without her.

The sky began clouding that afternoon and by three o'clock the rain came as scheduled. Sarah watched through the windows, watching it drip softly among the trees and wetting the whole Earth as far as she could see.

Her mother was busy with needlework and the men were hotly debating the merits of some fantastic and insignificant jet-drive mechanism.

Of them all, Sarah was alone in her discontent, alone and afraid. And they seemed, as if by conspiracy, to ignore her in her solitude.

Her mother spoke once, and then she turned to Commander Walker. "What are you going to do if the fish pond goes out? You said the dam would never stand another rain like

this one, and you haven't done anything about it."

He waved the question away with superior knowledge of such details.

By morning the storm began to abate, the clouds were pierced with sunlight as the air mass was lowered by the controlling beams to conserve its remaining moisture for another location.

But Commander Walker, reading the automatic rain gauge records, fumed. The total catch was only sixty per cent of his order.

Sarah slipped into her coat and boots and left the house as he called the Bureau to report his opinion of forecasters and demand the remainder of his order.

With surprise, she found Ken standing just outside the doorway, his face revealing an unbelievable awareness of the spring glory about him.

He smiled almost shyly. "Feel like going for a walk, Mom? It's a swell morning for that."

"I'd love to, Ken. Let's go on up the hill and see what things look like from there."

They started out together as the door opened and Commander Walker roared at them: "We're going to have some more rain this morning if that Weather Bureau can find enough brains to get those clouds back here. Better not go far. Stay in range of the old house on the island. The forecasters are probably mad enough to

give it all in one bucketful. And I'll sue if they cost me any topsoil!"

Ken laughed and waved a hand as they retreated from the house. "We'll be all right. Don't worry about us. We like the rain."

The light in his face was a joyous thing to see, and Sarah thought suddenly how little there had been of it during the past years. She thought back over the times that Rick had left them alone, and it seemed there had been nothing of closeness or love between her and Ken. He had always pulled away in the direction of his father's horizon—and she had pulled against almost everything he had wanted.

They walked past the steaming barns and the low grumbling noises of the cattle within. The meadowland underneath their feet was squashy from the rain and she had to grasp Ken's arm to keep her feet beneath her.

He was big, like Rick, and the hardness of muscle in his arm startled her. He seemed to have grown almost without her awareness, she thought in panic.

"I've decided I won't go with Dad," Ken said abruptly. "I know how you feel about it. I'm not going to ask any more. We talked about it last night. I told him, and he said it was up to me."

She couldn't see his face, but she knew how it must look. Yet her heart gave an involuntary leap within her.

He was offering the thing she most desired at this moment—or so it appeared.

But it was only appearance. She understood—as he didn't at this moment—that some day he would hate her for the unspoken pressure by which she had forced him to this decision.

"We'll talk about it more, later," she said. Her voice was hoarse and barely audible. "We may find another answer."

They came to the low rise behind the barns and followed the base of it towards the old creek bed, long dried up and overrun with grass. There had once been a sizable stream here, but a dam in the low hills beyond held back all the water that used to flow in spring freshets. This was the fish pond where the runoff from the hills was trapped.

Across the dry stream bed was a rise on which stood the first farmhouse of the place, now long abandoned. The stream had once run behind the house, but one sudden spring flood had washed a new course and left the house stranded on a tiny island between the two branches. It did not matter, for the house had been long abandoned even then.

Now Sarah and Ken turned their steps towards it. Ken glanced at the sky. "It looks like Grandpa is about to get all the rain he can use. I'll bet the forecasters are so tired of his grumbling that they're really going to let

him have it."

Sarah stopped and glanced anxiously for the first time at the low gray ceiling that was settling with furious intensity.

"We'd better get back," she said. "We'll be drenched if we get caught out here." But already the first drops had started to fall.

"I think it's been raining quite a while over the hill there," said Ken, nodding towards the rise that hid the fish pond. "We'd better go up to the old house and wait it out."

It seemed the sensible thing to do. Sarah hurried on, clutching Ken's hand for support. The bottom of the dry creek bed held three or four inches of water already from the previous rain. They sank to ankle depth in it, and tried to hop across on projecting rocks. Finally, they scrambled up the opposite slope to the house. Their footsteps rattled like dry bones on the old, weather-beaten porch.

From the moment they set foot on it, the rain spurted in torrents. It hammered the aged roof and began to pour through holes. Ken and Sarah dodged, clinging to each other and glancing apprehensively upward.

And Sarah found that she was laughing.

It was a strange and startling discovery. Ken was laughing with her, and she sensed that he, too, felt that they had not laughed together for a very long time.

They clung momentarily in this miracle of laughter, and then it slowly died away in Ken's face. He relaxed his hold on his mother, and then it was there between them again—the wonder and the agony of their divergent lives.

They sat down close to each other on the porch floor, their backs against the wall. Water fell and splashed on either side of them. They watched the sheeting rain, and listened to its roar on the roof.

Their own silence was long. Ken shifted uneasily. Sarah sensed his embarrassment in not knowing what to say to her in this moment.

She broke the silence. "Why do you want to go to Mars?" she asked suddenly. "Can you tell me in just a single phrase that will make me understand this thing?"

"It's what I've got to do," he answered, forgetting his former promise to abandon the plan. "There's one thing that each man in the world is born to do, Grandpa says, and I believe him. Mine is out there in space.

"Think of all there is yet to do! We haven't even reached the last planet of our own System. Somebody living now is going to be the first to make it. That could be me. And there are the other Systems like ours.

"They're talking about an SOL—speed of light drive—out there on Mars now. Dad thinks he may get in on some of the development work on that. We could reach the nearest stars

with it.

"I've been born in the best age the world has ever known! I can't turn my back on it. You have no right to ask it of me."

"I won't ask it," said Sarah quietly. "I'm going to let you go—you and Dad—you can go together."

"That isn't what we want. We don't just want to go by ourselves. We need you, too."

"No!" Her voice was so shrill it startled her. "You'll never get me to agree to anything like that. I'll give you all the freedom you want for yourselves, but you can't ask any more of me than that."

From a distance there came a sudden sound of thunder. It rose from somewhere in the hills above them, and a gathering roar shook the old house on its rotten underpinnings. Sarah and Ken glanced up the little valley with wonder and apprehension, and the roaring grew.

"The dam!" Ken cried. "Grandpa's pond—the dam's broken!"

Sarah recalled her mother's complaint about ordering so much rainfall to drain behind the weakened dam. It was incredible that her father should have underestimated such a risk. But now she could see the gray tongue of water curling down the dry creek bed, widening swiftly, some of it overflowing the banks and racing towards the barns and corrals across the meadow.

Then she saw it flowing through the other branch around the house.

"We can't get out of here!" she exclaimed. "There's water all around the house."

Ken eyed the widening reaches of the water. "The bed's pretty well filled up down below so that it won't drain, but it won't be more than six or seven feet deep at the most."

"But how'll we ever get across?"

He grinned as if he were now in the midst of something he could enjoy. "We'll swim, of course."

"No. Your grandfather has the boat he takes to the lake for fishing. They can pull it up here on the trailer and take us off."

"All that trouble? Come on, let's swim across. There's no need to wait for the rain to quit. We couldn't get any wetter than we'll be crossing."

Sarah looked down at the roiling water with distaste. "They'll come looking for us soon. There's no sense in trying to make it across now."

Ken was halfway across the porch. He turned and looked back with boyish pleading in his eyes. "Oh, come on, Mom. Let's not do it for sense. Let's do it for fun!"

For a moment she had a chilling impression that somewhere a key had turned within a lock. She halted in her movement towards him.

To her eyes, resting on his, it seemed as if understanding flared between them—as if some window had opened, letting her see for the first time through the murky turmoil between them.

Let's do it for fun—

It was so simple she wanted to cry. She had sought for a thousand complex answers to explain the lives of the men who baffled her so.

Let's do it for fun—

They had crossed oceans and prairies in ages past. And now they circled the Earth and reached out to the planets, and Ken already had thoughts of other stars beyond the sun. Their far horizons—they crossed them for fun.

Let's do it for fun— It was so simple, but was it true? How long had it been since she had done anything for fun, for the sheer pleasure of it? Her memory ranged back over the years and they seemed barren of anything but a dread intensity that hovered in the sky on the wings of rockets.

Ken was alarmed by the sudden, half-hysterical giggle that escaped her as she put her hands up to her face and hid her eyes from his sight for a moment.

"What is it, Mom? What's the matter—?"

She looked at him again, and her eyes were shining in a way that he had never seen before. "Come on—" she said.

It was a crazy thing—they could just as well wait—and she knew if she stopped to think about it she would never go through with it.

There was only one way to find out if it were true—if it were possible to do anything for fun any more.

She stripped off her coat and outer

clothing and raced down the slope clad only in her underthings. She stopped at the edge of the water and waved to Ken who struggled with his shirt on the porch. He was grinning in pleased astonishment.

"Wait a minute," he called. "We can put a rock in these and throw them across."

He made a couple of bundles of their clothes and hurled them across the stream. They landed with a squashy sound on the other side.

"Now we've got to go!"

It wasn't cold. The rain was still falling, and it seemed warm on her bare skin. She looked down at herself. She wasn't old, but she couldn't remember another time when she had stood almost naked in the rain. She opened her mouth to taste it. She wondered how many other things that were fun she had missed.

Ken took her hand and they walked into the water. It was colder than the raindrops and closed like circling ice about her legs and waist and chest. But it felt good. She felt as if thirty years' terror had been stripped away with her clothes.

Her father had been so busy crossing his own horizons that he had never thought to explain why they had to be crossed. He had forgotten to tell her that it was fun and she had never sensed it through her dread.

It had taken Ken's impulsive, naive wisdom to explain it to her—and this simple adventure to prove it. And now

she knew it was true.

Ken was grinning but puzzled. The puzzlement didn't matter, for she was seeing him really alive for the first time in years. All his joy and life had been suppressed in her presence before now, and she had not known it.

Abruptly, her feet slipped on the grassy slope and she went down. Ken grabbed her and buoyed her up, and then they were both laughing and swimming and sputtering their way towards the opposite slope.

The sky was breaking as they started wading again, and Sarah saw the figures coming towards them, her mother and father and Rick. Rick broke into a run.

Ken squeezed her hand hard, and looked at her as if he understood the feeling that was in her. "Aren't you glad we didn't wait for them, Mom?"

Then Rick was grasping her hand and pulling her towards him, wrapping his own dry coat about her wet shoulders. She looked up into his worried face.

"I've got a surprise for you, darling," she said. "We're going to Mars, all of us. It will be fun!"

He scowled in wonder. "I don't know what that's got to do with this, but if it's true it's wonderful."

She didn't get to say more. Her

mother was bustling up insisting that Ken take her coat against his wishes.

"Dad knew that dam couldn't take a rain like this. He knew it was weak and ordered rain anyway. Now look at the expense of building the pond again," she complained.

At first the words didn't register through the cold and unpleasantness that was beginning to settle upon Sarah. Then their significance cut sharply. She looked at her father and her son. She caught the momentary glance that passed between them.

And then she understood. A fantastic scheme, a play of their production in which she had been assigned a role without her knowledge. It had worked. They had shown her that the narrow restrictions she called her world could hold the same uncertainties as the vaster universe in which they lived.

But it was Ken's impulsive, unrehearsed invitation that gave her the insight she needed.

Let's do it for fun.

She smiled at her father as he caught her watching them so intently. He flushed as if he guessed she understood what they had done.

She nodded. "It's a lovely vacation, Dad. I'm going to remember it when we're on Mars. And today, I think I've crossed my own horizon."

THE END



RADIATION

BY KELLEY EDWARDS

A moderated nuclear reactor can't explode like a bomb. But by the very nature of the vicious energies being harnessed, even a minor accident can present an appalling problem!

Illustrated by Rogers

The pile hummed softly to itself as a billion billion neutrons were born every second, spent their hasty, free microseconds of wandering existence and then died in the hearts of nuclei. Liquid metal flowed its hot way through stainless steel tubes, expanding and heating as the uranium gave it heat, then cooled as it turned water into steam.

This heat, transformed, pulsed along high power lines that hurried off on long, striding poles, carrying precious

electricity to a snow-covered land. The instrument board in the control room glowed with red lights, each for a neutron-absorbing rod that was not inside the pile. The electric clock on the wall said two seventeen. The operator's face said it was a.m.

The survivor sat in the office, smoking a cigarette and trying to compute his off-shift pay in his head. His name was Hank Hennessy. He'd gotten past the cents and the dimes, and was working diligently on the dollars when the

Health Instrument man came in. He had a sheaf of papers in his hand.

"Hello, Wes," Hennesy said. "What can I do you for?"

"Talk to me," Wes said. "Tell me of the Company and of the Employee Savings Plans. Paint me a word picture of the Glowing Future we all have in the atomic energy business. Butter me up. And while you're at it, explain how come you've had high badge and pencil readings for two weeks running."

Hennesy sighed. He looked at the end of his cigarette, decided he'd held it long enough and ground it out in the wastebasket.

"How high?" he said, uninterested.

"Three fifty last week, which I mentioned to you, if you will recall, and three sixty-five this week. Where did you pick it up this time?"

"This time," Hennesy said carefully, "I am clean. I can account for every minute of my time in a danger zone and every radiation reading taken."

"You got it at the burial pit," Wes said. It wasn't a question.

"You were there with me," Hennesy said. "You were carrying the instrument."

"And you," Wes said as he lowered his bulk into a chair, "stuck your fool head over the edge of the pit to see where to dump the dirt."

"Let's don't argue," Hennesy said. "It's too early in the morning to argue. Let's just sit and look at the pretty red lights."

"O.K.," Wes said. "If you don't care, I'm sure I don't." He crossed his legs. He reached into his shirt pocket with his left hand and pulled out a cigarette—not the package, just one cigarette. He'd learned that during the depression.

Hennesy put his feet up on the desk and reached for his own cigarettes. He had the pack in his hand when the alarm bell screamed in his ear and the lights blinked and turned green. The bell was so strident he dropped the cigarettes and leaped from his chair by reflex. He was into the control room in less than a second.

"What is it?" he yelled at the operator over the grinding screech of the bell. The operator sat dazed at the control desk, staring unbelievably at the green lights and the pointers of the selsyns which all said zero.

"Did you do it?" Hennesy yelled at him.

The operator shook his head. "I was just sitting here," he shouted, "when bang! everything went in."

Hennesy scanned the instruments hurriedly, then put his mouth close to the operator's ear and said, "See if you can turn off that bell." He turned and started to check more instruments. He looked at the glowing spots on the oscilloscope that represented the temperatures of the tubes, dimming now as the heat drained out. It looked all right—no. There was a spot missing. He counted up and over to be certain of the tube, then swung to a panel and

plugged in a cord. There was no pressure on the tube.

The screaming of the bell suddenly stopped, as if it had been choked off. The operator came back in the control room with a smile on his face.

"I cut the leads," he said. "It won't ring any more."

"Peachy," Hennesy said. He reached for the phone.

The Health Instrument man lumbered up to him and laid a gentle hand on his shoulder.

"I don't want to alarm you," Wes said, "but the integron on the charging machine is off scale and the one on the top of the pile is going up." He paused for a moment. "They read 100 r full scale," he said sadly.

Hennesy bit his lip and set the phone back in its cradle. "Why should they do that?"

"Because they are exposed to a great deal of radiation," Wes said, as if talking to a child.

"I know that, you ape," Hennesy growled, "but where is it coming from?"

"From the looks of the meters, it's all over the front face of the pile," Wes said.

Hennesy started for the door. "Let's have a look," he said. Wes caught his arm suddenly and spun him around.

"Look, Hank," he said, "if you want to go take a look you can, but anything that will send an integron off scale that fast will kill a man in a

hurry."

He let go of Hennesy's arm and looked at him steadily. "Better think it over," he said slowly.

The phone rang suddenly and Hennesy picked it up. It was the power substation.

"This is Hennesy."

"What happened over there?" The man's voice was surly. "Why didn't you let us know you were going to shut down?"

"We didn't know it ourselves," Hennesy said. "You getting power from Prime?"

"Yeah, they started up as soon as you hit the deck. When you gonna be going again?"

"I don't know. I'll let you know when I find out."

He hung up the phone. It immediately rang again. He picked it up with annoyance.

"Hennesy," he barked.

"Kent. What happened?"

"I don't know, Dave. We lost temperature and pressure off a tube and it killed us. I haven't had time to check into it yet."

"Temperature *and* pressure?"

"Yeah."

There was a short pause. "Where's the radiation?" Kent asked.

"In the front."

"I'll call out our spare crew and set up a twenty-four-hour schedule," Kent said rapidly. "We'll keep operating as long as we can, but I don't know how long that'll be. We're not

set up to operate very long—just when you guys are down to change fuel. We'll keep rolling as long as we can."

"Thanks, Dave," Hennesy said. He cut the connection with his finger and let up immediately. He got a dial tone. He set the phone down on the control desk, picked up a phone book, found the number, then picked up the phone again. He dialed. He heard the exchange begin to ring the other phone in long, exasperating rings. It rang five times before it was picked up.

"Hello." The voice was sleepy.

"Mike? This is Hank. We're down."

Pause. "What happened?"

"We lost temperature and pressure on oh nine thirty. It killed us."

Pause. "Temperature *and* pressure?"

"Yeah. HI says there's radiation all over the front."

The voice was no longer sleepy: "Is Prime going?"

"Yeah. They got up just after we went down. Kent says he'll hold on as long as he can.

"He'll have to hold on longer than that." Mike cleared the sleep out of his throat. "O.K. Find out all you can without getting fried. I'll call the maintenance gang and get them out there as soon as I can." He stopped a moment. "I guess we better call Health Instruments, too. We'll need all the HI men we can get. And Hennesy!"

"Yeah?"

"Do nothing 'till I get there. Look around, find out all you can, but don't

do anything. That clear?"

"Yeah," Hennesy said sourly. He hung up.

The operator was standing next to him, a happy smile on his face. It had been a dull shift until the pile went down. "Can I do anything?"

"Yeah," Hennesy said. "Sit down and be quiet."

"Sure," the operator said. He sat down with a smile on his face.

Hennesy turned to Wes. "Is there any way we can get a look at the front face?"

"You might try it with a mirror. I checked the corridor and it's not too bad. You better put the mirror on a pole."

"Grab your instrument," Hennesy said. "I'll be back in a minute." He strode out of the control room, through the office and into the hallway beyond. He started for a door marked MEN, paused a moment, went past and through one marked WOMEN. He pulled a wooden framed mirror off the wall, tucked it under his arm and went out. He stopped by the janitor's room and picked up a broom and some string, then started for the control room. He met Wes in the hall.

"You ready?"

Wes nodded. They went down the corridor, their quick strides setting up echoes as their shoes scuffed the rough concrete. Wes held the meter, which looked like a Buck Rogers ray pistol, in front of him as he walked. He

glanced occasionally at the dial and at Hennesy. Suddenly he stopped.

"Hold it," he said.

He watched the needle as it slowly rose, then stopped.

"We're getting some here," he said.

"How much?"

"About ten."

"R?"

"Mr."

"That's better," Hennesy said.

"It's just a little way more."

"Take it easy," Wes said. "It'll probably go up pretty fast."

They moved slowly forward, glancing at the little needle as they moved.

"This'll do it," Hennesy said. He took the mirror from under his arm and began to tie it to the end of the broom.

"Couldn't you have done that where there wasn't any radiation?" Wes asked.

Hennesy didn't answer. The mirror was heavy and awkward, and it didn't want to stay where he put it. The string was too light for the job. Finally he got it together and slid the mirror slowly over the concrete toward the doorway in front of them. It started to buckle and he let up, lifting it a little, then slid it forward again. It wouldn't quite reach. He inched forward, sliding the mirror, until it passed the edge of the doorway. He lay down so he could look into the mirror. At first it was jumbled because his angle was unnatural, then he located the elevator and the mas-

sive charging machine and oriented himself. He tried to locate the offending tube, but it was lost in the maze of piping that made up the front face of the pile. He could feel the HI man leaning over him, looking.

There was something on the floor. He couldn't be certain for a minute, and then he saw what they were. Small cylinders, glinting brightly in the reflected light, lay strewn about the floor as far as the mirror would allow him to see. He heard Wes let his breath out suddenly and knew that he had seen them, too. Without saying anything he got up, flattened himself against the wall of the corridor and stretched his arm toward the doorway, reaching for a light switch. His fingertips brushed it and he inched forward a little, curled his finger over it, and pulled it down. The lights went out suddenly, all except a light farther back down the corridor. He lay down again and looked for the little cylinders. He could see them all right, each outlined by its own bluish, unearthly glow.

He got up again, stretched out, and turned on the lights. Without another word, he and the HI man walked slowly back to the control room.

At three o'clock men started drifting in, lack of sleep drawing at their faces and disturbed fear showing in their actions. At three thirty-five Mike Janos came in and the meeting

started. Hennessy had told his story a dozen times as little groups of men came in, and he told it again to Mike. The men all listened as if they hadn't heard it before.

Mike slid his wiry frame into a chair and looked around the room.

"Well," he said, "here we go. It was bound to happen sooner or later, I suppose, so we'd better get at it."

A man with a round face and thick glasses raised his hand a little to indicate he wanted to say something, realized he wasn't in a classroom, and lowered it sheepishly. Mike saw him and nodded.

"How did the fuel slugs get out there?" the man asked. "Did the tube explode?"

"I don't know," Mike said. "A lot of things could have happened. It might have got plugged and heated up, and the coolant could have vaporized and blown off the cap. Maybe the tube cap wasn't on-tight, and the pressure worked it loose and blew them out. Anyway, they're out there, and we've got to pick them up."

He got up and walked over to the door of the control room, then came back.

"This is going to be something," he said slowly. "I know most of you men have worked in radiation zones before, but I doubt if any of you have dealt with intensities anything like we'll have here." He looked at a slip of paper in his hand. "We've got sky-shine on the top of the pile of about a

hundred mr per hour, which means a working-time limit of an hour there. In the corridor just off the work area it's two hundred—a half hour. In the far corridor it's five r—that'll give a man twelve minutes. In the work area itself—" He paused and looked at Wes.

"The Victoreen went off scale," he said. "That's the highest reading instrument we've got," he added unnecessarily.

"You see what we're up against," Mike said, putting his hands in his pockets. "We've got to get those slugs picked up and out of there, clean up the contamination from the coolant, fix whatever went wrong and get operating again. Prime is operating, but they were just built as stand-by to carry us over normal shutdowns, and there's no telling how long they can run." He paused. "I guess you already know it, but I'll tell you anyway. If we don't get going, and Prime cuts out, the whole state of Alaska and the Canadian seaboard will be without power. This means schools shut down, factories idle, and probably a lot of people dead if they depend on us for heat. And a lot of them do. I sent a wire to the Commission in Washington, and they'll do all they can, but I'm afraid it's up to us."

He took a deep breath.

"You men and the few on swing shift are all we've got. We can't afford to have you burned out and use-

less to us for a week, because we haven't got a week. My guess is forty-eight hours at the outside. It's going to be higher level work than any of us have ever done before, and we'll have to make our own rules as we go along. I don't want anybody hurt, and I don't want anybody leaving their badge and pencils in the office when they're on the job so they won't get exposed. I've seen it before and I don't want to see it now. This is not child's play, this is not something to kid about. If Wes' guess is right"—he hit the little slip of paper on the table—"a man will pick up a lethal dose of radiation in about four seconds if he sticks his head in the work area. We've got to pick them up, but we've got to stay whole doing it, because we've got to keep operating after it's all over."

Mike Janos ran his fingers through his short, graying hair. He slouched into a chair and looked around the room, meeting the eyes of each man in turn.

"Let's have your ideas," he said.

Hank Hennesy lit a cigarette and stretched his legs under the table. Mike Janos and Wes Wieszczech sat at the far end of the office, each with his own thoughts. The round-faced man with the thick glasses, whose name was Stilmore or Filmore, sat at the desk, making hurried calculations with a pocket slide rule.

Hennesy inhaled the smoke and let

it ease out of his mouth, thinking. He thought of the mirror and the little cylinders that glowed in the dark, and he thought of lead shields on trucks and mechanical men. The crew was busy on a forty-five-foot pair of tongs which could be operated from the top of the pile around a corner, and the operator and an HI man were outside stacking lead bricks on a hand truck. Stilmore or Filmore was trying to figure out how much lead they would need from some hurried measurements made in the corridor with a few lead bricks. The measurements weren't good and he was a little afraid to trust the man with the glasses. He didn't care a great deal for physicists, anyhow.

He thought of the blue glow again, and of lead bricks. It wasn't going to be easy.

Mike cleared his throat and reached for the phone, dialed a number and waited. Hennesy could hear the click as someone answered at the other end.

"Hello, honey," Mike said. "I hope I didn't get you out of bed. . . . Good. Look, honey, we're in kind of a jam, and we're going to need some food. Enough for about eighteen men. And I'm afraid it's not going to be just one meal, but several. Can you arrange it and have it brought out here? . . . Thanks, honey. Don't worry. I'll call you when I can . . . Yes, dear. Good-by."

He laid the phone back on the cradle and lapsed again into thought.

The door opened and a tall man named Wood came in.

"We've got the tongs ready, Mike," he said. "HI gives us two hours on the top and an hour about a foot from the edge. Do you want to come up?"

"Sure," Mike said. He got up and they went out. Hennesy got up to follow them.

"Why you going along?" Wes said. "You'll just be in the way."

"I want to see it," Hennesy said.

He followed the two men outside the building into the bitter cold, around the thick concrete wall that housed the work area, and back into the warm building again on the far side of the pile. They had to climb a ladder-up to the top because the elevator was bathed in invisible, lethal radiation. There were three men on the top when they got there. The tongs lay along the steel floor and extended out over the front of the pile. An HI man turned a switch on his instrument, adjusted it to zero with a knob and turned it back on again. He looked very unconcerned.

"We rolled a cask out into the work area on a dolly," Wood said. "We couldn't get it too close to the front face, but I think we can reach it. The tongs are counterbalanced so they can be managed. They're jerry-rigged, but they ought to work."

"How can you see what you're doing?" Mike asked.

"We've got a mirror rigged on a pole over the edge," Wood said,



pointing. "I'm not sure we can see enough, but I think it's worth a try. If we can't, we'll just have to look over the edge. HI will give us fifteen seconds."

The men were working the unwieldy tongs over the front of the pile, lifting them, where they were jointed, by a rope strung over a beam higher up. The tongs wobbled and swayed.

A short, sweating man took the handle and squinted up into the mirror. He moved the handle back and forth, first in small sweeps, then in larger ones.

"I can't see the end of the tongs," he complained.

Wood took the handle from him and swung it back and forth, then pushed the long rod forward. He moved the handle again. He pushed and then he moved the handle. He started to sweat a little on his forehead as he worked with the heavy tongs. The HI man moved up to him, took a reading with his instrument, then moved back again.

"It's no good," Wood said, finally. "You can't see enough in the mirror."

Mike ran his hand through his hair, slowly.

"Looks like we'll have to move up to the edge," Wood said.

"I'd rather your men didn't get exposed right away," Mike said. He looked around.

Hennesy cleared his throat. "I'll

try it, Mike," he said.

"All right," Mike said. "You got your pencils?"

"Yeah."

Mike turned to Wood. "Can you get them up there so he can work from the edge?"

"Sure," Wood said. He moved off and gave instructions to his men, then helped them move the massive pipes that made up the tongs closer to the edge of the pile. The HI man followed them, keeping his meter always by the man closest to the edge of the pile. Twice he reached out and pulled a man back who was getting too close. He didn't say a word.

"O.K.," Wood said. "You can try it."

The HI man slid up near the edge of the pile and extended his instrument over, keeping his head and body well back. It went off scale. He pulled it back, switched it to a higher scale, and extended it again. He watched the needle come to rest and then pulled back.

"I'll time you," he said to Hennesy. "You've got about fifteen seconds over the edge, and a little more than that where the handle of the tongs is. When I yell, you come back in a hurry. I'll give you the full fifteen seconds."

Hennesy nodded and rubbed his hands on his pants to get them dry. He moved slowly toward the tongs, planning just what he would do, thinking how it would look so he wouldn't

waste time. Then he ran forward and grabbed the handle. He leaned his head over the edge of the pile. He didn't feel anything and it surprised him a little—he knew he shouldn't, but then there was so much of it.

He could see the slugs lying around the floor, and the cask, foreshortened by his height, resting among them. The fingers of the tongs lay beside one of the metal cylinders. He moved his hands and opened the fingers, putting his weight on the tongs to move them. They were heavy. The fingers slid past the slug, and he changed directions, moving the other way. He lost sight of the slug as the massive fingers moved over it. He lowered the end of the tongs, closing the fingers by moving his hands together, then lifted. He missed. He swung them down again, over the slug, losing sight of it as before, opening the fingers, closing them, lifting. The slug was gone; he had it. He fought the heavy tongs around, moving the end toward the cask, over the black little hole that was the opening, carefully so as not to drop the slug, slowly, awkwardly, as the heavy tongs moved and the invisible radiation tore his cells apart—there. He opened the tongs and saw the slug flash as it dropped into the cask. He swung the tongs back toward another slug, saw it disappear, opened the fingers—

"Time!" the HI man called.

He closed the fingers and lifted. He had it.

"Come back, Hank!" Mike called. He swung the heavy tongs toward the cask.

"... Second," he grunted.

They swung too far. He stopped their swing, started them back again. Too fast. He slowed them just in time, pushed, saw the fingers hover over the black hole, opened them—the flashing slug hit the edge of the hole, stopped, then fell off, outside the cask. He dropped the handle and ran back from the edge of the pile.

He heard the men let their breaths out, and realized that he was holding his own. He let it out in a long sigh.

"I got one," he said to Mike. "I had another one, but it missed the cask and fell outside."

He suddenly realized that he was sweating. His hands were clammy and his forehead was wet, and his legs were a little unsteady. He sat down.

"Why didn't you come when I called you?" the HI man said. "You were there almost twenty seconds."

"It seemed like an hour," Hennesy said, breathing deeply.

"You're through for the day," the HI man said. "You're burned out for today."

Mike laid his hand on Hennesy's shoulder. "Thanks, Hank," he said. Then he turned to Wood. "I'm afraid it's no good. We'll burn out too many men, and then we may not get them all. We'd better go back to the office."

Hennesy sat for a long time before he felt he could manage the ladder.

The men in the office were grouped around the table, eating sandwiches and drinking coffee that wasn't hot enough. Hennesy found that he was very hungry and tried not to look like a pig as he reached for his fourth sandwich. There were plenty for all. The rest of the maintenance crew were sprawled around the control room, eating and waiting. Hennesy looked at the clock and realized the sun must be up, although no outside light came through the concrete walls that housed the pile.

The telephone rang.

"Janos."

Mike's face took on a worried look as he listened. He listened for a long time without speaking, running his hand through his hair as he listened. Then he said, "All right, do the best you can." He hung the phone up. "Prime," he said to the men looking at him. "They're heating up on the near side and they're going to have to cut power. It's happened before, but they just held on until we took over." He ran his hand through his hair again. "We'll have to get moving."

"The portable shield should be ready pretty quick," Wood said. "I've had two men working on it since we got here. We've got another mirror suspended on the top of it, and a shorter set of tongs that will reach over the top. We managed to get a rope across the work area to the far corridor so we can pull the whole thing out where you can reach the

slugs." He paused. "It's going to be messy," he added.

"The whole thing is messy," Mike said. "Who's going out in the cart?"

"Miller and Harvey. There's just room for two."

"There should be an HI man along," Wes said.

"That's right," Mike agreed. "Better just send one man." He turned to Wes. "You got a man?"

"Sure," Wes said. "Me."

"Can't you send somebody else? We may need you later if this doesn't work."

Wes looked at Mike calmly. "I *could*," he said, not taking his eyes off the older man. Mike looked at him for a minute, then turned back to his sandwich. The subject was not brought up again.

Wood got up and went out. He came back in a few minutes, with no expression on his face. "It's ready," he said. They got up and went into the corridor, Hennesy bringing up the rear.

The shield was made of lead bricks, stacked to form a wall on three sides of a hand truck. A mirror was mounted at a forty-five degree angle over one end of the shield, and a pipe with an angle in it drooped sadly over the edge.

"It ought to have a floor in it," Wes said. "We'll get a lot of scatter off the concrete."

"We couldn't do it," Wood explained. "The truck is overweighted

now. The physicist . . . what's his name . . . said we needed six inches of lead, and that's what we put on it. We wanted to make it on all four sides but we couldn't do that, either. We've got a couple of rods with rubber tips so they can move themselves a little, but the thing is so heavy they don't do much good."

Wes said, "Who's going?"

"Miller," Wood said. He looked around. The short sweaty man stepped forward, hitching at his overalls.

"I ain't seen Harvey," Miller said. "He may be in the control room."

"Harvey won't be going," Wood said. "There's only room for two and you'll need an HI man."

Miller looked relieved. "Yeah," he said. "I got to thinking about that."

They pushed the cart down the corridor. It took three men to move it easily, even though the wheels had been freshly greased. Hennesy's mirror was still where he had left it, and they had to move it to get the cart past. They fixed the heavy rope that led around the corner into the work area to the front end of the cart.

"You know what to do," Wood said to Miller. "Do the best you can. Give us a call when HI says you've had enough, and we'll pull you back. And be careful."

"Sure," Miller said. He climbed onto the cart and picked up the end of the tongs. Wes climbed on behind him, zeroing his meter.

Suddenly, an alarm bell began to clang, loud and strident, drowning out the little murmur of conversation from the watching men.

"What is that?" Mike shouted over the noise.

"Sounds like an integron warning," Wes shouted back at him. "Probably the one in the far corridor went off scale."

Mike turned to one of the men.

"Call the far corridor and tell them to start pulling," he said in the man's ear. "And kill that bell."

The man scurried off. The bell rang on, shrilling its deadly warning. Miller hitched at his overalls and wiped his sleeve across his mouth. He hunched down behind the shield.

Without warning, the cart began to move. Wes dropped behind the shield hurriedly as the cart moved toward the work area. The front wheel caught on the edge of the doorway.

"Pull back," Wood shouted at his men. Two of them picked up the rope trailing behind the cart and pulled it back. They pulled to one side to straighten it out, but it was too heavy. Wood gestured, and three other men grabbed the rope and pulled. The cart slid a little on the concrete.

"O.K.," Wood shouted over the ringing of the bell.

The men let go and waited. Nothing happened.

"Go tell 'em to pull again," he said to one of the men.

The cart started to move, suddenly.

It just missed the edge of the doorway and lumbered slowly out into the invisible inferno of the work area.

Miller raised one of the rubber-tipped pipes and waved it back and forth. The cart stopped. He turned on his side a little, bent over, and peered into the mirror. Wes leaned down beside him and looked, too. The cylinders were there, all right, and there was something else, too. For a moment Wes didn't recognize the little silvery blobs that looked like molten solder until he remembered that the metal coolant must have been ejected, too. That would make it nice. Bismuth was so easy to clean up, especially when it was lousy with polonium.

Miller was working with the tongs, trying to pick up one of the slugs. The insistent clanging of the bell seemed to make him nervous as he fumbled with the heavy tongs from an awkward position. Wes looked down at his meter, then hurriedly switched it up scale. He was supposed to protect this guy, and here he was rubbernecking around.

"I can't see the cask," Miller yelled at him. "I'll wave at them to pull us farther in."

"Nothing doing," Wes shouted in his ear. "It's coming through the floor and probably off the wall behind us. We're burned up already. Tell them to pull us back."

"Aw, Wes—" Miller began.

"Aw, nothing, soldier," Wes said.

"I'm off scale at five r and no telling how high it is. Tell them to pull us back. Now."

Miller wormed around and waved toward the corridor from which they had come. Nothing happened. He moved again so he could see the doorway, waving.

"They've dropped the mirror," he said in Wes's ear. "They can't see us."

Wes hunched around and looked back at the doorway. The mirror was lying flat on the concrete, shiny side down. Someone was trying to pull it back with the end of the broom. The broom reached out past the mirror, then slid back. It moved over the edge of the mirror, not moving it.

"Pull us back!" Wes called at the top of his lungs. He knew it was no good as soon as he finished, for he could hardly hear himself above the screaming clang of the alarm bell. He tried it again.

"Pull us back!"

Nothing.

"Can you tell the guys on the far side to pull us that way?" he said in Miller's ear.

Miller shook his head, moved himself heavily to get his mouth where the HI man could hear him.

"We ain't got a signal for that," he said. "They'd just pull us slow."

Wes looked around at the doorway again, and back at his meter. It was still off scale. He shook it a little, but he knew that wouldn't do any good.

even as he did it.

Someone was reaching for the broom again. The pole slid over the edge and then moved back. The mirror moved slightly; then the pole slipped and was gone. It didn't come again.

"Could we make a run for it?" Miller said.

"Not a chance. We'd be fried by the time we got there." Wes paused a moment. "We may be anyway," he said, softly so Miller would not hear him.

His ear hurt, suddenly, and he realized the bell had quit ringing. It was so quiet by contrast his voice sounded like thunder.

"Pull us back!"

A voice called from the doorway, "What?"

He started to shout again, but they were moving, slowly at first and then more quickly, toward the doorway. He looked at his meter again as they moved, but it hadn't changed. It looked for an awful minute like the wheel was going to strike the edge of the doorway and he reached for one of the pipes to fend it off, but it slid past and into the corridor beyond.

Wes got up and stepped off the cart, taking out his handkerchief and wiping it across his forehead and around his neck. He held the meter in a limp hand.

"What happened?" Mike asked, worried.

"Scatter off the floor and shine

from the wall. We were off scale at five r."

Mike's face suddenly looked older.

"Any idea how much over?"

Wes shook his head.

"How long were you out there?"

"Four minutes," Hennesy said.

"You may still be all right."

"Sure," Wes said. He turned to Miller. "Give me your badge and pencils," he said, holding out his hand. "I'll take them up and read them. Don't go into a danger zone again, and stay here till I come back."

Miller gave him the badge and pencils, and Wes set his instrument carefully on the floor of the corridor and started back to his office. Every man watched him go, not saying anything. After he was gone, the men turned slowly and walked back toward the control room. Two of them started to speak to Miller, then changed their minds and were silent.

They sat around the office, not saying much. Mike didn't look at the door Wes would come through, but Miller did, often. The men spoke to him in soft tones, but he answered with one or two syllables and they were silent. Tiny beads of sweat glistened on his forehead, and he rubbed his hands up and down his thighs, up and down, looking at the door. Hennesy lit a cigarette and tried to think of something to say that wouldn't be silly or stupid, but he couldn't so he kept his mouth shut. Mike looked

down at the papers on the table, little drawings of the great long tongs and the cart with the lead bricks on it, not looking at Miller. His face looked older than Hennesy had ever seen it.

The door opened.

Mike looked up suddenly, then recognized Wood and lowered his eyes again to the drawings in front of him. Wood went over and sat next to Miller, watching him run his hands up and down the damp thighs of his overalls.

Then Wes came in. He had the badge in his hand and the pencils. He didn't wait to be asked.

"Six thirty," he said. "Mine was six ten."

Miller's face didn't change.

"We're all right," Wes explained. "We better stay away from radiation for a couple weeks—maybe a month if we can work it. But we're all right."

Miller's body relaxed. No one had realized how tense he was holding himself until he relaxed. A slow, easy smile found his mouth and his eyes.

"You took your time about coming back," he said.

Wes smiled a little. "I wanted you to sweat," he said. The men could tell from his voice he'd hurried all he could, so they let themselves laugh. They laughed much harder than they should have.

"Good, Wes," Mike said. "I'm glad to hear it."

He was, too, Hennesy thought. He was very glad to hear it.

Mike cleared his throat. "We've still got those fuel slugs to get rid of," he said. "I'm out of ideas." He looked around the room at the men. He could tell from their faces they, too, were at a loss. "There must be a way," he said. "We've got to find it."

They sat for a long time in silence. Hennesy lit another cigarette, and then another, thinking. Phone calls came, one after another. From prime, from the power boys, from town. One was a long distance from the Commission in Seattle, but they were no help. They just wanted to know how things were coming.

They ate. The coffee still wasn't hot enough. The hours dragged by. Ideas were born, presented, and shredded into little bits by Wood, Mike and Wes. Many started with "How about —" and then stopped, lapsing into thoughtful silence.

Hennesy thought about the little cylinders in the work area until they became unreal, figments that didn't exist. Then he thought about Alaska and the long, cold winter and the hundreds of towns that depended on them for power—new towns that sprang up on the bleak Yukon when electricity became available. The pile gave them life, and the pile was down. He shifted uneasily in his chair. Better think about the slugs again.

After a while, Mike analyzed the situation. He started at the beginning, leaving nothing out, putting into words everything they knew of the

slugs, their positions, the two failures. He hoped, by putting the whole thing into a clear picture, someone would have an idea. Nobody did.

The men in the control room began playing cards and talking about women, so Mike quit thinking about them. That could go on for hours without losing anything. He tried his resume after a while, throwing in all he knew and could picture of the pile, the work area, the front face. He went step by step through Hennesy's trial with the tongs until Hennesy felt almost as if he had lived it twice. He went through Miller and Wes' try, getting everything out of them he could. Then he lapsed back into silence, thinking.

Hennesy became aware that Wood was talking. He listened idly, turning a few ideas over in the back of his mind, slowly. He'd thought them all through and they were no good, but he had to think about something. Wood was saying,

"... Pick them up one at a time, anyway. There's too many. What we really need is a mechanical man, or a trained monkey, or an octopus. Eight arms would be nice. We could—"

"Hey!" Hennesy said.

The men turned to look at him. He thought a minute, turned it over—there was no hole he could see. It ought to work.

"Look," he said, "can we raise the elevator without getting fried?"

"I don't know," Wood said. "Maybe. Why?"

"If we could get the slugs into the pit, we'd be a long way toward getting them, wouldn't we?"

The physicist looked puzzled. "Pit?"

"The pit under the elevator," Wes explained gently. "There's a pit under the elevator so you can get the charging machine down to the first row of tubes."

The physicist flushed a little, realizing everyone in the room knew that but him.

"How would you get them down there?" Mike asked.

"With a fire hose."

Nobody said anything for a minute. Hennesy could see their minds take hold, turn it around and inside out, thinking of ways and means. Mike looked into his eyes for a long time.

"I think it would work," Mike said.

"We could build a dam in the far corridor," Wood said, "and shove it into the work area with poles so that any slugs washed against it would go into the pit. I think we could do that all right." He stopped, thinking.

Wes said, "You'd better make a watertight dam on this side and on the far side too, to keep the water in. It'll pick up polonium from the bismuth and wash it all over the place."

"We can do that," Wood said.

"How do we get the elevator up?" Mike asked. "It's all the way down now."

"How about reaching down with a long pole from the top?" Wood suggested.

"No good," Mike said. "The switch is like on a telephone switchboard—you have to hold it down or the elevator stops. You couldn't do that with a long pole from the top. I don't think you could even see the switch from the top."

"How about this?" Hennesy said. "Take a long pole and put a wire on the end, like this." He held two fingers out to form a horizontal V. "Get a lead weight and tie it to a loop of string, then put the string over the wire, so." He put the invisible string in a loop over his fingers. "Lower that down there, and slip the string over the switch and let go. The weight will pull the switch down and the elevator will go up."

"How do you stop it?" Wood asked.

"It'll hit the limit switch at the top and stop itself. We don't care where it is, just so it's up."

Wes said, "My wife's got a pair of binoculars that you fit on like a pair of glasses. She got them to watch the opera, but we never went to one."

Mike turned to him. "Good," he said. "Get them."

Wes got up and went over to the telephone. Mike turned to Wood, saying, "Better get your men going on those dams. And the pole. We'll get out the fire hose, say! Isn't there a drain in the pit?"



"Yeah," Wood said.

"Where does it go?"

"Oh, down through the pile pedestal and out to the river drain, I guess. Why?"

"We'd better find it and plug it up. I don't want polonium dumping into the river if I can help it. We'll have to plug it anyway. We can fill the pit with water, and that'll give us some shielding—maybe enough. We could load the cask under water in the pit from above. Its—what? Six feet?"

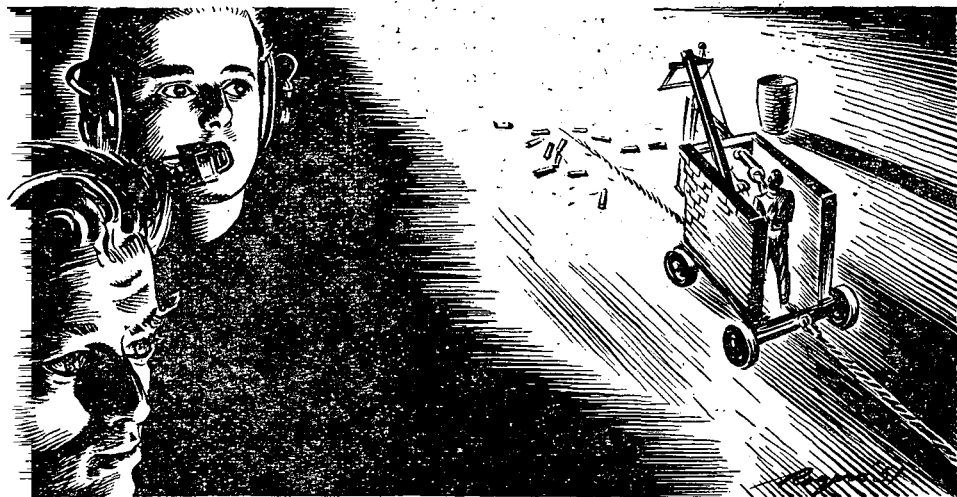
"About that."

Mike turned to the physicist. "How much will that cut it down?"

"I'll work it out," the physicist said, adjusting his thick glasses and taking the slide rule out of shirt pocket. "It ought to be enough."

Wes put the phone down and said,

ASTOUNDING SCIENCE-FICTION



"They're on their way."

"Good," Mike said. "Is there anything we've overlooked, now?"

"It might be hard getting at the elevator switch," Hennesy said. "The 'I' beams and stuff on the top of the elevator will get in the way. I think we can work around them, though."

"What about if a slug gets pushed against the far wall?" Wes asked. "How will you move it?"

"They're not heavy like natural uranium," Mike said. "If you hit to one side of it, the side away from the pit, it should wash it in the right direction. We've got a lot of soup on the fire hose."

Wood was in the control room, issuing instructions. Men left in several directions, each on their part of the job. Then Wood came back into the

office.

"It's rolling," he said. "It'll take a while, but they'll get it done." He paused. "They'll get it done quick," he added, with a little smile. "They think it'll work good."

Hennesy tried not to smile, tried not to show the bubble of pride that swelled in his throat.

Then they waited. The minutes dragged by even slower than they had before. Mike glanced again and again at the clock, waiting impatiently. For lack of something better to do, they ate again. The guard that brought the food in gawked around, trying to see everything. He'd worked there for three years and this was probably the first time he'd seen the control room.

They talked it over, from start to

finish. Each detail was described, each problem thought of. The things that could go wrong were analyzed, and preparations made for them should they happen. Mike called prime and told them things were looking up, but he didn't give them any details. He sounded happy as he talked over the phone.

Then they waited some more. Hennesy ran out of cigarettes and started smoking Wes', who promptly ran out, too. They were well into Wood's pack when the man showed up with the pole.

There was no place to try it out, except on the top of the pile building on the outside. They had the men take it up there before they realized it was dark outside, and then brought it back down again. The dams showed up and Wood left the office to watch them being installed. Hennesy went in search of a cigarette, didn't find one, and came back disgruntled.

The guard came in again with the binoculars, looking at them with a peculiar stare, and left them with Mike. They all tried them out, looking through the large window between the office and the control room at the instruments on the far wall.

"I think we're ready to go," Wood said as he came in. "The dams are in and we found the drain. It had a valve on it, so we cut it off." He held up a plumb bob on a loop of string. "Here's the weight."

"Let's get moving," Mike said,

getting up.

"Sure," Hennesy said.

"I thought you were burned out," Wes said to him.

Hennesy didn't answer, following Mike and Wood out the door into the corridor. The fire hose was stretched along the concrete floor, lying flat and empty. They went outside the building into the cold night and around and up the ladder to the top of the pile. The ladder seemed longer than it had before, Hennesy thought. They had a little trouble getting the pole up the ladder.

"Where's the switch?" Wood asked him as they got to the top of the pile.

"Down at this end," Hennesy said, pointing. "It's on a little box right at the end of the elevator." He turned to Mike. "Mike," he said, "maybe I ought to do it. I know right where the thing is. Somebody else might not know it if he saw it."

"I thought you were used up," Mike said.

"Just for today," Hennesy said. "There's tomorrow, and the next day, and the day after that."

Mike grinned. "O.K. But be careful."

"Sure," Hennesy said.

He took the binoculars out of his pocket and put them on, adjusting the focus on the far wall. He moved his head around a little to get used to them, then took them off and reached for the pole.

Mike was talking to the HI man. "Can we give him thirty seconds? I know it isn't strictly legal, but a lot depends on this job."

The HI man shrugged his shoulders. "It's his funeral," he said.

They tied a rope around his middle so he could lean out over the edge, and wrapped it once around a railing farther back. Hennessy inched the pole over the edge, careful to keep the string and the plumb bob in place. He moved forward to the edge, slipping on the binoculars, and looked down.

Suddenly he was falling. The elevator was right below him; the slugs were right there—illusion. It frightened him just the same, to be so close. He moved his head and the scene whirled and twisted, moving faster than he could see. It took a few seconds to get used to it. The pole was below him, foreshortened alarmingly and blurred as it came closer. He located the plumb bob and lowered it carefully between the metalwork on the top of the elevator, over toward the switch. Time was passing as if it were a physical thing, flowing past without stopping, and he was slow—so slow. Mustn't hurry. Mustn't drop the thing. He inched it slowly toward the switch, the plumb bob swinging on its string, threatening to dance off the wire and drop free. The switch was so little—he slipped the loop of string slowly over the switch and lowered the pole. Suddenly he knew it

would slip off, it wouldn't hold, if he let go—it would drop on down and there'd be no way—

The clanging of the elevator bell broke the silence and he could see the elevator start to come up. The string was over the switch and the pole was free, hanging just below him, it looked like just a few feet below him. He pulled the pole up and forced himself back from the edge, using the rope around his waist as a lever. The clanging of the elevator bell continued to ring. He held his breath. It rang. He tried to count time slowly, one thousand one, one thousand two—then he was sure the elevator was clear of the pit and he let his breath out in a long sigh.

"Twenty-two seconds," the HI man said.

Mike was grinning from ear to ear. "I'll buy you a beer," he told Hennessy. "Better yet, I'll buy you two beers."

They waited, listening to the bell, until the elevator came slowly and ponderously into sight and stopped as it came level with the top of the pile. The bell stopped.

"Round One," Mike said. "Let's watch Round Two."

They scrambled down the ladder. It was much longer; this time, Hennessy thought.

The men had the fire hose ready to go. At Wood's signal, it sprang into life, a writhing thing, and water

sprayed from the nozzle in a hard stream. They held it with three pipes clamped just back of the nozzle, keeping themselves flat against the wall out of the radiation beam. It fought as if it had a life of its own, thrashing the nozzle back and forth as they tried to hold it.

"Against the far wall," Wood shouted against the noise of the rushing water. "Work toward the pit."

Hennesy got down and looked into the mirror. It was a bigger mirror this time, and he could see nearly all of the work area. He saw the slugs roll before the water, hit against the wooden dam and wash into the pit. The water played back and forth, pushing and washing the little cylinders into the pit at the edge of the pipe.

The HI man looked at his meter. "You're getting them," he said. "It's going down."

Hennesy looked for the little cylinders. They bounced and rolled, this way and that, but always toward the pit.

"This way," he called. "Toward us. There's a few over here you're missing."

He watched the stream of water snake around and catch them, rolling them into the pit. The HI man stuck his instrument around the corner. "It's way down," he said, "but they're not all gone. There's still some out there."

"They're all gone that I can see," Hennesy said. "I can't see any more

of them."

"Play it around some more," Wood called to the men. "Try to get it."

The men moved the hose again, first to the far side, then to the near. Then they did it again. The HI man looked at his meter, shook his head. "They're still there."

"Turn off the lights," Hennesy said.

One of the men reached over and flipped the light switch and the scene in the mirror winked out. Hennesy closed his eyes for a moment to get used to the darkness, then looked again. He snaked forward and moved the mirror.

"Can we get around there and take a look?" Wood asked the HI man.

"I guess so, if you look quick."

Wood slid up to the edge of the doorway and thrust his head into the work area. He pulled it right back.

"Over against the far wall," he said to the men. "Almost in the corner. You can see it glowing. Shoot for the corner."

The men pulled the hose around, aiming.

"I can see it," Hennesy said.

"You're getting it. Work it toward the pit."

He watched the little blue glow roll before the invisible stream of water, dimming as water covered it, then brightening again. Then it was gone.

"You got it."

The HI man held his meter around the corner. "Turn on the lights," he said. "I can't see the meter."

The lights came on with a bright glare. He looked at the meter, pulled it back, switched ranges and extended it again. "You got 'em," he said, finally. "Practically no reading."

Hennesy got up and looked with the others at the work area. There was nothing to see, but he had to look, just the same.

"Don't go in there," the HI man said. "Probably polonium all over the place. You'll have to put on protective clothing so you won't get contaminated."

Hennesy turned and grinned at Mike and Wood, who were grinning widely at him and at each other.

"I think we can take it from here," Wood said. "We'll fill the pit with the fire hose and load the slugs in the cask from the elevator. We'll recharge the tube if we can, if not we'll take it out

of service until the next shutdown. I think we've got it licked."

Mike put his arm around Hennesy's shoulders as they walked back to the office, each of them grinning from ear to ear. They just couldn't stop grinning.

"We ought to be going again in a couple of hours," Mike said. "I better call Prime and let them know—and the others. Then, I'm going home to bed."

"Me, too," Hennesy said.

Mike turned to him suddenly, a peculiar gleam in his eye.

"And the next time something like this happens, Hennesy," he said severely, "see that it happens on the day shift so I don't have to get up in the middle of the night."

Hennesy grinned.

"Sure," he said. "I'll do that."

THE END

THE ANALYTICAL LABORATORY

Gentlemen, you have presented me with a bit of a problem for analysis; there is a violent dislike in the field of science fiction for fantasy stories. "Telek," which I thought was a darned good yarn, still based largely on the concept of teleportation-telekenisis—and I had a certain slight hesitancy that it might be considered a bit too much on the fantasy side to be rated as pure science fiction. My hesitancy was . . . well, here's the scores.

JANUARY 1952 ISSUE

<i>Place</i>	<i>Story</i>	<i>Author</i>	<i>Points</i>
1.	TELEK	Jack Vance	1.61
2.	THAT SHARE OF GLORY	C. M. Kornbluth	2.38
3.	INSTINCT	Lester del Rey	3.20
4.	THE ANALOGUES	Damon Knight	3.71
5.	SITTING DUCK	Oliver Saari	4.00

All right, so it wasn't fantasy.

THE EDITOR.

CLOUDS

BY ROSCOE FLEMING

The experimental work in cloud-seeding has been going on for several years—and the value of the work is still uncertain. Seeding does produce effects. But what overall value do these effects have?

"Everybody talks about the weather, but nobody does anything about it."

—Charles Dudley Warner, 1891.*

"Knowledge of Nature does not alone satisfy the human mind any more; it is control that tempts. And there we stand at the threshold of scientific vistas of enormous scope."—Helmut Landsberg, in the *Christian Science Monitor*, 1951.

Among scientists, meteorologists seem to be particularly susceptible to turbulence, temperature inversion and a low boiling-point. The group rates high right now in "mad scientists"—mad at each other. After a recent debate I heard one distinguished meteorologist say privately of another: "He reminds me of the old-time Mississippi River gambler—I always

expect him to pull a derringer out of his pocket." Another snapped at his critics that: "They should get their heads out of their iceboxes, and see what's actually going on."

The current cause of this controversy, one which Dr. Irving Langmuir compares to that over Pasteur and his germ theory, is the new practice of "seeding" the clouds to affect their behavior, most often in the hope of increasing rain. The Weather Bureau is so sure there's little to this thesis that Dr. Harry Wexler, its chief of scientific services, recently referred an audience to the "rain-making" crazes of fifty years ago. "People fall ever so often for this sort of thing," he said.

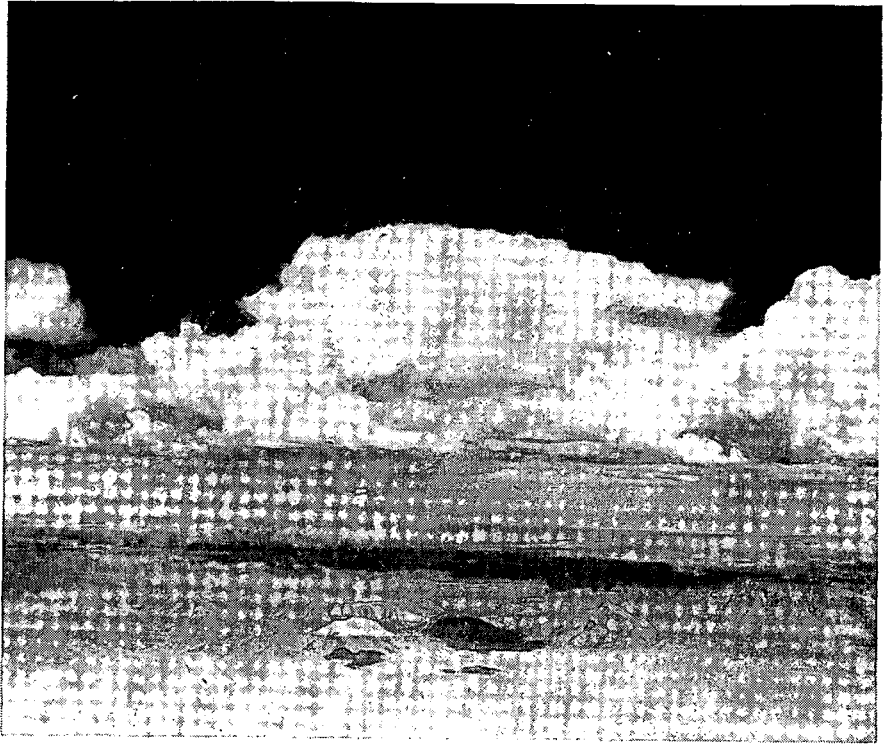
On the other hand, men of equal or greater standing among their fellows feel as sure that we are on the threshold of a genuine weather revolution. Dr. Vincent Schaefer, originator of the

* Well-nigh unanimously attributed to Warner's friend Mark Twain—the most persistently misattributed quotation in literary history.



GENERAL ELECTRIC COMPANY

"BIG THREE" IN SNOWMAKING. Vincent J. Schaefer, weather scientist of the General Electric Company's Research Laboratory, prepares to make a miniature snowstorm in a Home Freezer in his laboratory, while Dr. Irving Langmuir, at left, and Dr. Bernard Vonnegut watch. Schaefer first produces a supercooled cloud in the freezer by blowing in his breath. A few small particles of dry ice, dropped into the freezer, then turn the supercooled cloud into snow.



U. S. ARMY SIGNAL CORPS

A seeded cloud over Albuquerque on the afternoon of July 21, 1949, with rain plainly visible, falling from its base.

This picture shows a seeded cloud at the time of Project Cirrus' famous experiment of 1949, which Dr. Langmuir insisted was responsible for a million acre-foot rain on New Mexico.

technique now used, said at the same meeting that he believes eventually we shall be able to do almost anything we wish with the weather, though this may require world-wide organization.

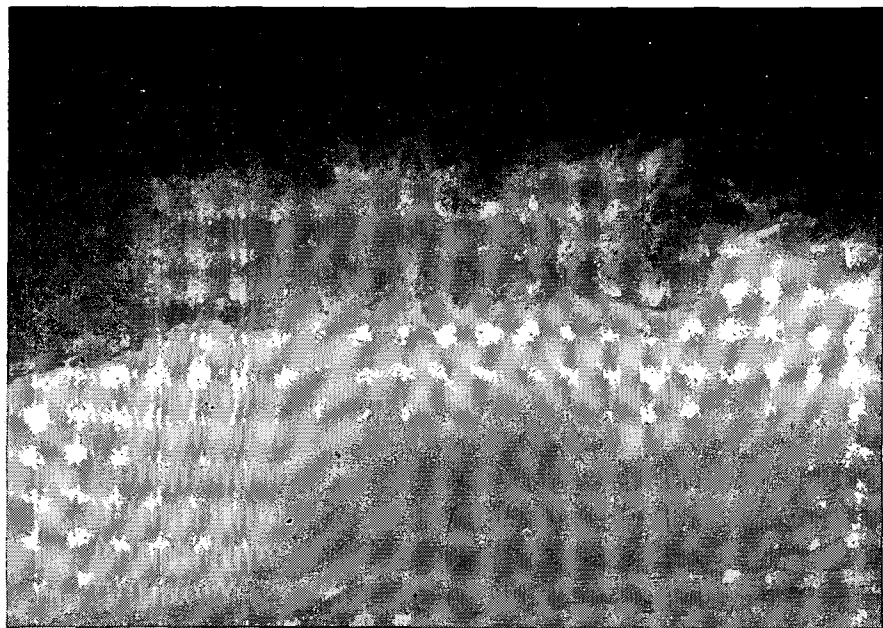
As for the customers, they are more confused than the scientists if anything; and whatever is done, a large minority at least won't like it. As soon

as men became aware of weather, they didn't like what the gods chose to serve, and ordered changes by way of prayer and rain rites. Now some of them look to the scientist. The result is social schizophrenia—in New Mexico in 1951, a rancher gave one hundred dollars toward a cloud-seeding project; his wife, denouncing this

as both a sacrilege and a waste of money, promptly gave her pastor one hundred dollars to pray for rain.

Some weather-scientists, including those most active in the new departure, now think we are slowly acquiring some real knowledge of the processes that bring rain and snow. These processes seem to revolve around the unromantic fact that our atmosphere is in one aspect a permanent dust storm, not alone of big

particles such as flew across the continent and into the sea in the 1930s, but also of much finer particles; averaging perhaps a millionth of an inch across. The cleanest air contains several hundred to the cubic centimeter, and the dirtiest air, several hundred thousand. They are too small and light to fall, unless dragged down by some such misadventure as becoming the nucleus of a raindrop or snowflake.



SYMONS FLYING SERVICE

One of the best pictures of a "seeded" cloud. You see this sort of cloud all through the West nowadays—visibly exploding. This picture is from California Electric Power Company, which is seeding its high Sierra watershed near Bishop, to produce more water for its hydro-plants. The Mexican government is conducting similar seeding in the high mountains there. This is by airplane—dry ice—because it is so difficult to get up to the high mountain peaks on the ground, and because the cloud envelops them.

One authoritative estimate is that if all the dust normally present in the atmosphere were brought together, it would make up a cube five hundred eighty-seven feet on an edge. And any cubic inch could hold up to a quintillion particles.

All meteorologists seem to agree that such particles play a vital part in the hydrologic cycle, in that most of them will serve as condensation nuclei. When moist air rises, it cools and becomes supersaturated—it can no longer carry so much moisture in the invisible form of water vapor. But the surplus vapor needs something on which to condense so that a cloud building before your eyes, is a sign that “condensation nuclei” are plentiful. They form the hard skeleton of the cloud; the droplets that condense upon them, its visible flesh.

But a cloud is, like an atom, mostly empty space. A cubic meter of the average cloud contains only about a gram of visible moisture, and this consists of globules so tiny that it takes a million or more of them to make up one average-sized raindrop. Further, they are in the cloud at average distances from each other, of about one hundred times their diameters.

How on earth—or rather in the sky—do they agglomerate and finally fall as rain or snow? Men have asked that for a long time.

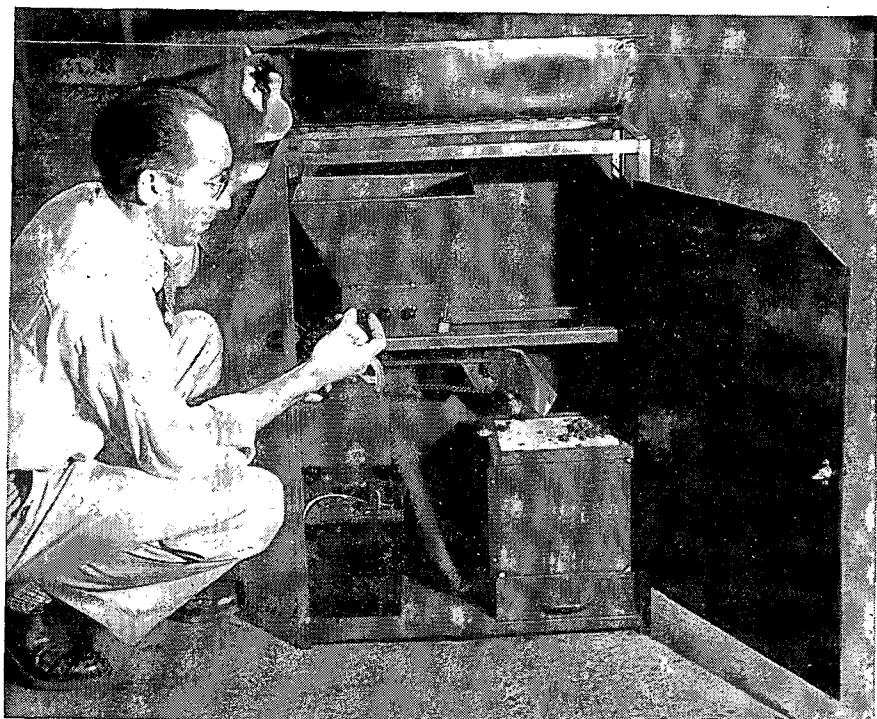
In the answer that satisfies the champions of cloud-seeding—though

not the more orthodox meteorologists who still insist that we don’t know—a few of these dust particles possess a rare and added quality; *i.e.* that water vapor in a supercooled cloud—one that is below freezing yet its globules are still liquid—will freeze upon them without first going through the liquid stage at all. These are called sublimation nuclei.

Ice crystals when present in such a cloud, will also serve as such nuclei. The new and controversial practice of cloud-seeding consists simply of producing more such sublimation nuclei in the form either of dust or of ice, than Nature unaided may have done, and putting them in the right place.

In 1930 a Dutchman named August Veraart strewed dry ice from an airplane into clouds. Showers followed some flights, but few people gave him credit. Later Walter Findeisen a German, argued that for snow or rain to fall, the clouds must be supercooled and must contain ice crystals or other sublimation nuclei upon which water vapor would freeze, thus growing snowflakes. In this theory, virtually all our rain begins as snow.

Incessant winds hurl such supercooled clouds across the top of Mount Washington. Thick coats of rime may cover every obstructing object, yet it will snow or not snow apparently by whim. This odd state of affairs caught the eye of young Vincent Schaefer of General Electric Company when dur-



RALPH MORGAN NEWS PICTURES

One type of ground-generator producing silver-iodide smoke. Coke impregnated with silver iodide is fed from the hopper just above the man's hand into the tiny furnace at lower right. A blower burns the coke at very high heat—about thirty-five hundred degrees. This produces very small crystals at about thirty quadrillion per minute, the smoke sifting out the open top and the heat floating it upward to the sky.

ing the war he aided Dr. Langmuir in some research for the military. Later he and Langmuir decided to explore further into the possibility of inducing rain or snow. Schaefer created his own “supercooled atmosphere” in a deep-freeze box out of GE stock, which he lined with black velvet, setting a brilliant spotlight to reveal its interior.

This box he filled with “supercooled cloud” merely by breathing in his moist breath. For weeks he carefully sifted in many sorts of fine natural dusts but with no result—the amorphous gray fog in the box turned on him always the same blank enigmatic stare.

“I had always in mind,” he has

said, "to try the effect of extreme cold, and the box got pretty warm on the afternoon of July 12, 1946. So I slid in a large chunk of dry ice." Instantly tiny snowflakes sparkled in the light beam, and fell to the floor.

On November 13, 1946, he dropped dry ice pellets from an airplane into a supercooled cloud. A long scarf of snow fell out. Langmuir met him when the airplane landed, crying, "This is history!"

Schaefer had found what might be called the "temperature approach." Temperature-wise, our atmosphere normally is in three layers: Above freezing next the ground; farther up, from freezing down to a point just warmer than minus 39 (c); thence, colder than the latter figure. That 39-degree "thick" layer in which clouds normally are supercooled, might be called our snow-or-rain factory.

At colder than -39 (c), cloud moisture will flash over into ice crystals without having anything to freeze upon. The feathery cirrus that floats so high is of ice crystals. But the great bulk of visible atmospheric moisture is in the supercooled clouds of the middle zone. They may float along indefinitely without snowing, unless Nature or man should supply sublimation nuclei. All this of course, is in the theory advanced to explain why seeding should be efficacious.

By sowing pellets of dry ice into such a cloud, Schaefer created thou-

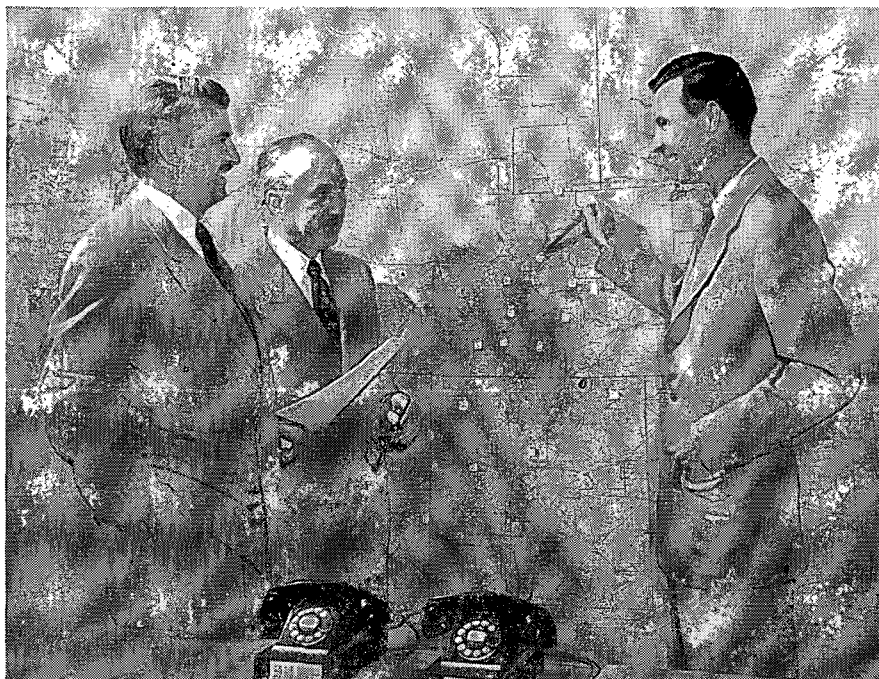
sands of vertical tracks down through it, along each of which the temperature was for an instant colder than -39 . This touch is enough to freeze ice crystals, which spread the effect by chain-reaction: Soon, cubic miles of cloud are thus "seeded." Vapor pressure is less over ice than over water. Hence an ice crystal will suck to itself more water vapor, which freezes on it in turn until a snowflake is formed to fall as snow, or to melt lower down into rain. It seems that the supercooled cloud droplets must first evaporate, then sublime directly on the ice.

Bernard Vonnegut, a young colleague of Langmuir and Schaefer, reasoned brilliantly that perhaps the moisture might be "fooled into freezing" by forms similar in structure to ice crystals. He found such forms in the crystals of silver iodide, a compound. Silver-iodide crystals are more efficient than anything Nature has, save ice crystals themselves—the former will start the freezing effect in clouds as warm as -5 (c), whereas none of the natural dusts tested by Schaefer will start it above -10 (c); and none are fully effective above -25 (c), while silver iodide is fully effective at -10 .

So if you have a supercooled cloud-layer three miles thick, natural dusts may start precipitation only from its upper fraction, while silver-iodide particles will start it throughout most of the mass of the cloud. By one simple stroke you have thus greatly increased

the output efficiency of our "rain factory." This is among the reasons why silver-iodide smoke, made by burning coke impregnated with the chemical in little high-heat furnaces on the ground, has largely superseded dry ice in commercial cloud-seeding. Also, flying is expensive, and is often hazardous in seeding weather; floating

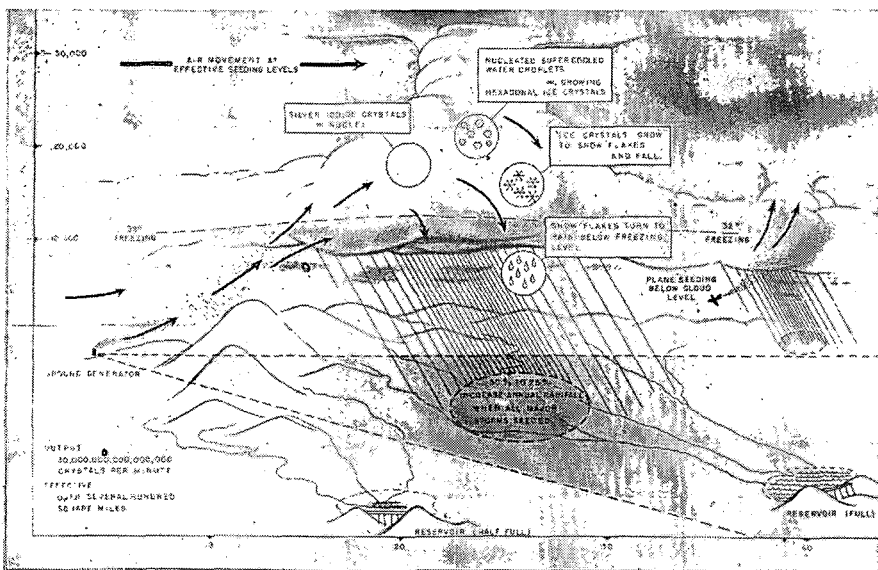
silver-iodide smoke up from below, thereby releasing into the base of the cloud the heat freed by freezing, tends to increase updraft turbulence and draw more moisture up to seeding levels; and finally, large cloud-masses may be seeded from one generator, by the time the smoke has traveled to seeding levels.



RALPH MORGAN NEWS PICTURES

The "big board" in Denver headquarters of Water Resources Development Corporation. Each tab represents location of a smoke generator, which is turned on or off at word from Denver. Incidentally they don't need to be in remote territory—one is operated from the roof of the laboratory in Denver. A few miles makes no difference. Left to right, Dr. Irving Krick; Theodore Gillenwaters, general counsel for WRDC, and Lee Cox, an area supervisor for WRDC.

snow changing in summer, into rain on the way down. Effective cloud-seeding requires that you put extra nuclei into the atmosphere at the right time, in the right place, and in the right numbers—the latter, because too many will soak up all the available moisture before more than a few flakes can grow large enough to fall. Then the cloud is put into “cold storage” and can aid rainfall only if the winds bring it into contact with a moist, supercooled air mass which



This idealized schematic is self-explained, at bottom. Krick uses planes only as a standby, and **ONLY** for hail-prevention projects then, since a thunderstorm may arise too suddenly to be successfully seeded from ground-generators. He is also experimenting with bombs made of thermit and silver iodide, to be shot from planes through threatening thunderstorms. High heat of the burning thermit is supposed to release silver-iodide crystals of right size—averaging about one-millionth of an inch across!—to serve as nuclei on which moisture will freeze. Lower heats make bigger particles. Such bombs, or candles may also be attached to balloons to rise rapidly toward the storm from the ground.

its ice particles can seed. Descending cirrus is thought to play a considerable part in natural precipitation. Of course "overseeding" is deliberately done in some situations, as to dissipate fog or avert hail.

After Schaefer's discovery, Western fliers took to the air like locusts, each intent on seeding to help out his neighbors, or to see what would happen, or just for the fun of it. One boy was hired by a group of farmers to try seeding a cloud. He came down and asked eagerly: "Did it rain? Did I bring anything down?"

"Didn't rain," grunted the hangar owner, "but you sure brought something down. Look!" He pointed to a big chunk of dry ice fuming itself away under a hole in the roof. The boy had just heaved it overboard above the cloud, and had by chance scored a direct hit on the hangar. In those days the people of an Oklahoma county got an ironic telegram of thanks from those of the next county down-wind, after a seeding experiment. The former, who had paid for the flight, had remained bone-dry, while the neighbor county got copious rains.

But most cloud-seeding in the West—its natural home because the region is largely semiarid and more rain could mean billions of dollars in additional income—is now done by professionals on a large scale. The largest firm is the Water Resources Development Corporation of Denver, headed by Dr. Irving P. Krick, formerly head of the

meteorological department of California Institute of Technology. WRDC seeded its first storm for pay in June, 1950, and by the late summer of 1951 had some forty contracts covering more than three hundred million acres, including one in Mexico and one in San Salvador. Of the half dozen other organizations in the field, most are run by former colleagues or students of Krick.

Krick is a pleasant man with enormous self-confidence, who's been an infant terrible to more orthodox meteorologists for many years. He has greatly extended the "analogue" method of forecasting, based on the intelligent study of past weather patterns, to match them as far as possible with upcoming ones to see what comes next. In World War II, he employed this method very successfully in picking out propitious European weather for both air and ground offensives. And he and his colleagues for years have successfully conducted a long-range weather service for business and industry.

Perhaps the quickest way to see how seeders try to modify weather, is to station ourselves in front of the huge "battle map of the West" maintained at WRDC headquarters in Denver. Each of some two hundred tabs represents a smoke-generator which on order will be ignited to produce silver-iodide smoke. Some are located at the windward bases of

mountain ranges—mountains also force up warm moist air masses, and thereby create conditions favorable for precipitation. Other generators are far out on the plains. Many aren't even in the same state with the people whom they are intended to serve—for each is from forty to one hundred miles from the area where rain may be desired.

In a process as intricate as three-dimensional chess with the whole atmosphere of the West for a board, Krick's people map the flow of rain-bearing air masses, and try to light off generators in time for the smoke to mingle with a fruitful cloud mass from a mile to four miles high. Most of the generators are off duty most of the time, for normally the seeders do not bother much with any but general storms—the huge swirling masses born far off-shore, that swing aboard the continent at irregularly regular intervals bearing many billion tons of water in their murky bosoms, and expending energies measurable only in terms of thousands of Hiroshima bombs.

In March of 1951, a seeded storm that curved inland and then down the Great Plains east of the Rockies, dropped seven inches of snow on delighted farmers—and three days later was again seeded to drop an inch of rain on thirsty San Salvadoran coffee-groves.

How far may the effect of a single smoke-plume reach? Langmuir insisted in 1950 that rhythmic seeding in

New Mexico showed up in rain-patterns as far away as New England; but later Schaefer, Vonnegut, and others showed that if silver-iodide particles are exposed to full sunlight, nine thousand nine hundred ninety-nine out of each ten thousand will lose their seeding-power in two hours, while under the murkiest conditions, ninety-nine out of one hundred will lose it in two days. But ice particles created in a supercooled cloud by the action of silver iodide, might retain their efficacy longer.

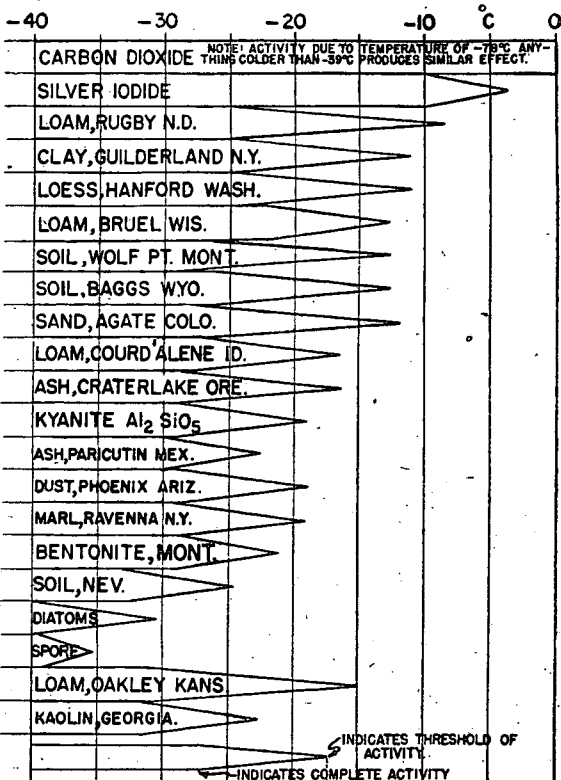
However, this is only one controversial point in a general brawl. The Weather Bureau continues to insist that its own experiments show little economic value to cloud-seeding. Its people discount much of the work of Langmuir, Schaefer, et al., but both groups would like to restrain commercial seeding so that the air might be left unsullied for far more sweeping and extended experiments in the interests of pure science.

The "pure scientists" including those of the Weather Bureau, back rigid federal control such as that proposed in a bill introduced by Senator Clinton Anderson of New Mexico. This would create a commission without whose permission no one could seed the atmosphere anywhere in the United States. Promptly this proposal called into being a new organization, ambitiously called the National Weather Improvement Association.

In the belief of many meteorologists, virtually, all our rain and snow comes from "supercooled" clouds—below freezing yet still liquid—in which specialized particles are necessary to start the moisture freezing into snowflakes, which in summer melt into raindrops on the way down. Lowering the temperature below —39(c) will start the freezing process spontaneously.

Vincent Schaefer tested many sorts of natural dusts, plus dry ice and the crystals of silver iodide, for the government's Project Cirrus. The chart above gives results. Briefly, it shows that most natural dust-particles will start the snow-making process only at temperatures far below freezing; and that most of them reach full efficiency only just above —39(c).

But dry ice—or anything else cooled to colder than —39(c)—will start the process at any point below freezing; and silver iodide crystals will start it at —4 and reach full efficiency at —10. Thus the cloud-seeder's two chief materials are "more efficient than anything in Nature" and will start the freezing reaction through much more of the mass of a supercooled cloud than will natural nuclei.



Its members are those of the local organizations formed to buy commercial cloud-seeding services. These organizations are voluntary, and have taken the form of nonprofit associations—convenient in case of lawsuits. The NWIA seeks state, rather than federal, regulation. For the future historian, the first weather-control law in history appears to be that of

Wyoming, effective February 19, 1951; and the state commission it created granted the first seeding licenses on May 1, 1951. This, and similar laws in Colorado and Arizona, lay claim in the name of each state to "the moisture contained in the clouds and atmosphere within its sovereign state boundaries."

In Utah, legislative action was

slightly different—it authorized local creation of cloud-seeding districts with taxing-powers. Heretofore in each instance, a minority of residents of each district has paid the freight with the majority getting a free ride—and some of these districts are nearly as large as Indiana.

As they have grown larger, costs have grown smaller. A cloud-seeding program now costs a cent an acre per year or less, for the whole area covered. Average annual contribution, even of the minority who so far have paid, is figured by Harvey Harris, president of NWIA, at around thirty dollars. As he points out, an extra one hundred pounds of beef, or an extra fifteen bushels of wheat, will more than repay that. Any further gain is pure profit. This small cost creates an enormous incentive.

Who can say whether cloud-seeding is so far successful in bringing more rain? Only time and statistics will tell, since the records kept of Nature's great laboratory without walls, the atmosphere, will produce a natural phenomenon every time to match anything which occurs, however unusual, in seeded territory.

Many parts of the West included in such territory are in better shape moisture-wise than for years, and in some such areas 1951 wheat yields, for example, broke all historic records. But on the other hand the drought which has plagued much of the South-

west for years, persisted and deepened during 1951 in many areas. This, however, is according to the book—everyone will tell you that rain cannot be “made” out of nothing. The clouds must be there and the moisture-content must be sufficient for natural rain, if there is to be any increase economically worthwhile. Such an explanation, however, does not assuage the frustration mounting to rage, of a group that has paid for rain but doesn't get it. In the old days those who withheld gifts from an idol as punishment could never be sure of their revenge—withholding payment from a cloud-seeder is much more satisfactory!

Then, of course, there is the constant accusation that seeding has caused such catastrophes as the dreadful Kansas flood of 1951. Here the weathermen came to the defense of the cloud-seeders by saying that natural conditions were more than sufficient in themselves. A cold air mass from the Arctic met a huge warm, moist air mass that had moved straight North from the Gulf—and they wrestled for four days like Jacob and the Angel, immobilized over Kansas while it rained, and rained and rained! There was no seeding within several hundred miles, and none in the direction from which the moist air masses moved. In fact, at WRDC they early noted the compactness of this mass, and wished vainly that it might fan out into seeding areas

which needed rain.

Then, if I am upwind and seed the clouds, thereby getting myself more rain, do I rob you, my downwind neighbor? Krick at least says no; he says that precipitation never drains the air mass of more than one per cent of its potential moisture over any one seeding area, and if you double the rainfall here, there is still ninety-eight per cent left for folks downwind. Beside, the dynamic nature of the whole matrix is such that mixing in the atmosphere, this transpiration and evaporation soon erases all trace of the effect.

Can seeding ever cause truly major climatic changes? Even the most optimistic men in the field seem to concede such a possibility to be for the far future. However, suppose you do put down more rain than Nature would have made, and so change a hundred million acres of prairie from a brown and arid expanse into one of lush vegetation, with billions of green plants transpiring moisture into the air to add to that rising by evaporation from streams and lakes, as well as from moist soil. Then it may be easier either for Nature or man to start more rain, if only because raindrops will survive in the moistened lower atmosphere to reach the surface, rather than evaporating away in "virga," or mere trails under the clouds, as happens so often when the West is plagued by drought.

There are, of course, many possibilities other than merely increasing the amount of usable moisture. In 1949 and again in 1950, two ex-Navy fliers named Harvey Brandau and Eugene Kooser "overseeded" potential hailstorms for the pear-growers of Oregon's Rogue Valley. For these two years in succession, the fruit escaped hail-damage, something that hadn't happened in more than forty previous years of commercial production.

Hail is, generally speaking, a scourge to the West of a virulence unknown in the East. On the Great Plains just East of the Rockies it destroys many square miles of crops each growing-season, with aggregate losses of many millions of dollars. A hailstorm seems to be simply a very turbulent thunderstorm, in which the bits of ice are hurled upon and down many times, gathering new layers each time, until they are spat like machine guns at the farms and people below. Some early clients of commercial seeders reported that hail from seeded cloud seemed smaller, softer, and mushier, presumably because seeding had induced rain before the storm could gather full fury. However, damaging hail occurred in 1951 at many points in seeded territory. In one area, the farmers financed an "overseeding" project—similar to that of Brandau and Kooser save that it was from the ground—and this area escaped almost without hail damage.

Seeding under whatever auspices will never please every one. Farmers near the Rogue orchards stormed that the overseeding deprived them of rain for their crops. The Continental Divide was seeded last winter to bring extra snow over the mountains—purpose, to increase spring run-off for irrigation-water. The irrigation farmers were pleased, but mountain mine owners and resort owners complained bitterly. In Oregon some cherry-growers say that a single raindrop will crack a cherry while it is ripening—and they threatened to hire people to follow around those seeding to bring rain—to “overseed” and thus prevent it!

But there is likewise a web of benefits. California Electric Power Company, seeding its watershed in the high Sierras by airplane, feels it has increased runoff by an average of twelve per cent over four years—and the surplus runs through its turbines down to the faucets of thirsty Los Angeles. Also, its pilot angled over in the summer of 1950 and seeded a promising young thunderstorm, which thereupon rained copiously and put out an inaccessible forest fire that had been burning for days in a remote

canyon. The Forest Service is thinking of similar means to put out or prevent some of the eight thousand forest-fires set in an average year by lightning in its forests. Prevention would involve overseeding to dissipate the peculiar “dry thunderstorms” of the West, which may travel for a hundred miles without rain, but with fierce and frequent lightning. Then one at least of the big airline companies is financing continued experiments into dissipating low-lying clouds and fog over airports.

Perhaps the most fitting expression as to the future of this great scientific adventure is not scientific at all, but legal. In the sole bit of legal language that can so far be dignified with the name of an opinion in this field—many lawsuits are threatened but none are so far invoked—Mr. Justice Pecora denied an injunction sought in the spring of 1950 by a resort owner in the Catskills against New York City's plan to attempt rain-making to replenish its reservoirs. Said Justice Pecora: “. . . The dangers which plaintiffs apprehend are purely speculative. This court will not protect a possible private injury, at the expense of a positive public advantage.”

THE END



COSMOPHYTE

BY JULIAN CHAIN

To the space-wanderers, the Tree Civilization of Earth was a blind alley. And it was a blind alley of technology—but not necessarily a blind alley of Life!

Apart from the many puzzles presented by unique social development of the species inhabiting this planet, another paradox is connected with its discovery by Irridelian explorers. It could hardly have been expected that the planet, in its present state of decadence, could offer its discoverers anything of

value, yet the net effect of our studies of this species has resulted in greatly expediting our program of colonization. This surprising development is due to the fact that the two inventions on which the economy of the species depends—the treehouse and the hydrogen fusion reactor—provide shelter and energy with a great economy of material. The introduction of these two devices as standard colonization techniques has immensely reduced the quantity of exports formerly required by our colonies from the home planet.

Kran Anthor: A popular History of Irridelian Spatial Expansion

"Another. Just like all the rest!"

Mara En Eltra heard, but did not see, the speaker. He could not tear his eyes from the planet whose green landscapes filled the viewing-ports of the cruiser. Nevertheless he protested voicelessly: "It's not just another! It's *the* one. The only one!"

Granting the speaker his ignorance, however, the remark was natural. The cruiser *Orallia*, out of Irrid, hung motionless over a planet that bore a strange name and nourished a different species, but the dotted-checker-board appearance of the small hedge-rimmed meadows with the single great house-tree in the center was disappointingly familiar. It was the standard design for all the new Irridelian colony-planets at which the *Orallia* had called during her long voyage from Irrid.

The similarity was hardly accidental. Mara had spent seven Irridelian years on Earth; first as social investigator with the Eleventh Expedition, then as economic specialist with the stated purpose of assimilating a background in florachemistry in order to adapt the native techniques to Irridelian colonization. The success of that adaptation was proved by the existence of a hundred self-sufficient models of the exotic original.

But Mara was not thinking of success. The familiar landscapes awakened in him another train of thought, touched with a wry wistfulness. How easy it was to steal a technique and

how difficult to appreciate a cultural attitude. All his efforts amounted to little more than the grasping of an obvious advantage or two while the more subtle treasure lay ignored. How could one express the measure of a ceremony? How acquire the unhurried certainty, the considerate formality, the long slow days of grace —

"San En Eltra. San En Eltra. To the captain's cabin!" The loud-speaker's triple statement tore Mara from his recollections.

Captain Tars Parran greeted Mara heartily. The mission of the *Orallia* was novel enough to require the services of a fleet cruiser, but it was sufficiently unmilitary to render Parran at a loss. Military tradition prevented him from enlarging on his difficulties to his junior officers, but did not extend to his civilian subordinate, whom he had made his confidante on the voyage. He had a good deal to get off his chest now. Frankly, the captain was a very sore man.

"Sit down man, sit down." He waved Mara into a chair; at the same time he struck a small gold gong on his desk. A steward appeared like a genie. "Drinks," he directed. To Mara, "You'll join me?"

Mara nodded, amused; he watched Parran splash the red liquid into the metal cups. Drinking was a Terrestrial custom that had swept Irrid, but this performance was as alien to Earth as anything could possibly be. On the planet below, wine was served as a

ceremony, the guest receiving his portion from the lady of the house in a crystal goblet. There the goblet was hand-wrought; the wine, home-grown and pressed, was poured gently and the white hand that offered the cup gave the giver with the gift. Here there was only the substance of the red liquid. That was genuine enough; the wine must have come from Earth itself, for on Irrid's busy acres agriculture was less than a memory. Only algae, yeast and derivatives of these were produced at home and the colonies had hardly begun to export. But the shadow of grace that lent significance to the drink was absent and it seemed to Mara that the substance without the shadow was itself a shadow.

"Drink up, drink up," said Parran, tossing off his own. "It's your last chance on board for a couple of days. I have instructions to transport a group of the natives to their third planet; that seems to be standard practice for every Irridelian craft calling here. I understand you are to conduct your studies on Earth while the *Orallia* plays nursemaid." The captain snorted with outrage at a procedure so overgenerous.

"Come, Tars, you don't begrudge the Terrestrials their own system?"

"Their own! Ha! Not when they have to wait till someone comes along to plant them on it!"

"You know better than that. It's

been well established that they visited Venus in the past and made it habitable. I myself was on the Eighth Expedition that brought back the evidence. Besides, they're surely giving value received."

"If you mean they're helping us make each of our colonies a new Earth, I, personally, would let them keep their gifts and much obliged. I don't see much to choose between the stiff-necked farmers on our new colonies and the natives themselves."

Mara chuckled. He knew that each of the colonies the *Orallia* had touched in its voyage affected Parran as a separate boil. The old inability of the military mind to adjust to civilian society, he thought.

"You don't know how to handle them, captain. You keep trying to treat them all like third-class spacemen."

"That's the truth! Whereas they ought to be handled like spacemen, sixth class, if there were such a thing!"

"If only you had them aboard the *Orallia*, you'd soon make them jump!"

Parran opened his mouth to agree vociferously, then, realizing he was being had, closed it with a snap. "You, on the other hand, seem to have a gift for dealing with them, for which I'll confess I'm grateful. Wherever did you learn it?"

"I don't know." Mara thought about it. "On Earth, I guess. Of course, Earth's more serene, more—"
More civilized, he was about to say.

"But the colonies have a type of society more like that of Earth than like Irrid, now. I suppose it's a question of Trees making the man."

Parran grunted. "You can have them both. All the same I'm thankful for your turn for diplomacy. In fact, I'm sorry to part with you even for the next few days, especially since I'll have the natives on board."

The repeated use of the word *native* finally nettled Mara. "The Terrestrials won't bite, captain, if only they're treated like . . . like—"

"Like Irrideliens? Thanks, I prefer to keep my species distinct. Though it would be easier if they didn't resemble us so ridiculously."

"Like intelligent beings, I was about to say."

"Oh, I forgot you're quite a partisan of theirs. No offense intended. Tell me, what do you intend to do during your stay?"

"Well, the government feels that there may be unexplored developments in florachemistry that might be useful in our colonies, apart from the house-trees which, together with the solar furnace, have proved so adaptable. Also I want to check on a few methods whereby the Terrestrials control their own productions. Some of their plants have run wild in our colonies and I'd like their suggestions. Mostly, though, it's a chance to revisit old friends." He looked up at Parran. "These natives, as you call them, have been extraordinarily kind and

helpful to me. More so than most Irrideliens."

At Mara's suggestion, the *Orallia* remained aloft that day, giving Earth time to prepare her welcome. With the first rays of morning the ship sank to her landing softly as a bubble. When she touched, a great wound opened in her side as a curved section bowed out and down to serve as a gangplank. A platoon filed out and lined at attention; a bit of military process Parran had whipped up to impress the "natives" in spite of Mara's pleas. They were impressed, no doubt; Mara felt his face grow warm as the welcoming group approached wearing the wooden expressions of suppressed mirth. The captain noticed nothing. The literal military mind could never appreciate the social sophistication underlying the apparently primitive economy. The painful part of it was that nothing seemed more ridiculous to Terrestrials than this type of callow ostentation. Mara translated to Parran:

"Permit me to extend welcome from the people of Earth to you and your ship and your"—the speaker glanced at the stiff figures at attention—"men?"

It was supposed to be a private joke; of course; the Earthman naturally assumed Mara incapable of interpreting his inflection. Before Parran could reply, Mara broke in: "I must leave now, Tars. Paneth here will

interpret for you." Red with embarrassment, he seized his grip and fled before the captain could say a word.

A figure detached itself from the group of Terrestrials and followed him.

"Mara En Eltra!"

"Charles Howard!" Mara gripped his hand, Earth fashion. Charles Howard had played host to him during his years on Earth. The long, slow, serene years; Mara felt them rise up, choking with remembrance. His embarrassment returned.

"I'm sorry, Charles. Please don't implicate me in that performance!"

"No, no, Mara. It is I who should apologize for Gordon's misplaced humor. Please believe he did not mean to be vindictive." A cloud passed over his face. "It is perhaps a defense against your too overwhelming civilization." He paused again. "A useless defense."

"No defense is needed. We mean no harm."

"Enough of this talk. Let me take you home."

"You may not believe how long I've waited for this meeting. Of coming back again to your Tree. If peace does not exist in the quiet glades of Earth, then it can be found nowhere in the known Universe."

"You may not find it so peaceful here as you remember it. Irrid brings change and, with change, unquiet."

"Ruth, is she at home?"

"My wife, also, is not quite the serene hostess you remember. Re-

sponsibilities have descended on all of us who have come into contact with your people. Ruth is concerned at present with arrangements for transporting some of our people to Venus, with the aid of your ship. She can be of help because she speaks your tongue. But come along."

The landing place of the *Orallia* was the point at which the First Expedition had touched and which had become the base for all subsequent Irridelian craft. The proximity of the Howard's Tree to the landing site had led to their initiation into the mysteries of the extraterrestrials and accounted for their role of host to Mara during his studies of terrestrial flora-chemistry. The Tree itself stood in a miniature valley set in a circle of barely higher ground. As they topped the rise, Mara paused to take in the scene.

It could be matched nowhere else in the universe; even the new colonies were crude copies. The tamed landscape lay as mute testimony to the men and women that had lived on the land, worked it, and loved it for generations; men and women, moreover, who were unexcelled in the skill of modifying fauna and terrain. The entire valley now gave the appearance of an experiment in evocative design in the fragrant, blossoming material of living plants. Beside this vision, the man-made cliffs of Irrid, as Mara remembered them, seemed repulsive and dull; a fit home only for robots.

The Tree itself was centuries old, a home to more generations of Howards than the present transients could remember. Mara, fresh from the economy of Irrid with its standardized and quickly obsolete products, examined the Tree and its appointments with wonder. His memory, he decided, had been blurred by the countless crude models on Irridelian colonies. Here everything bespoke the countless years of skillful and unhurried craft; each object was a minor work of art. He remembered an old Earth saying: "Man is the measure of all things." He did not unconsciously translate the word "man" to the corresponding "Irridelian."

The small talk and reminiscences were interrupted by the arrival of Ruth Howard. At the sight of Mara she stopped with surprise, with an attitude of being taken unaware in a situation not wholly pleasant. Then something within her relaxed and she came up to him, taking his hand in both of hers. She smiled.

"Welcome back, Mara! Welcome back to Earth and our Tree."

She disappeared into the kitchen, returning almost instantly with wine and cold meats. She filled Mara's crystal glass and held it to his lips cupped in both palms. He took one sip and accepted the cup. The ceremony lacked for nothing in significance, this time. She filled her husband's glass and her own.

"Forgive my cold greeting, Mara. I was tired and a little wretched with the work of getting our people aboard your ship." She made Mara grin and her husband start with an almost unwomanly insult: "Your Captain Parran is a most uncourteous person."

"I've called him stronger things on occasion."

"Frankly, he seems to regard people as something less than animals. And that parade of wooden soldiers! I don't remember your previous study groups unpleasantly, but this Parran person is a weed!" She turned to her shocked husband. "I'm sorry, Charles, but times change and, apparently, manners are changing with them."

"The other expeditions were made up of scientists," said Mara. "This is your first experience with the military."

Ruth's dark eyes snapped. "If Irrid expects co-operation from us in the future, it may as well be the last. I'm quite serious!"

Mara looked up, startled. On Earth, language as strong as this had that "I've told you for the last time" implication. Clearly, more was involved here than an individual outburst; translated into Irridelian terms this represented an ultimatum from one planet to another. Presumably, therefore, a group existed with policies and powers, and Ruth held an important position in it. Considering the Howards' familiarity with the Irridilians, their inclusion in such a group would

be natural. But Mara's experience with Terrestrial society had left him with the definite conclusion that the prevalent state was one of anarchy. He decided to probe further.

"Am I to present your point of view to the Space Bureau as official?"

Ruth glanced at her husband. It was Charles who replied.

"I think you may."

"It seems you were right, Charles. There has been more change on Earth than I could have imagined. If I'm to make representations to the Space Bureau perhaps I need to know about some of them."

"Our Committee—" Charles smiled, "Yes, there is one. Our Committee has decided the time has come to inform Irrid of its existence. We were content to co-operate on an informal basis with your previous study groups, but the visit of the *Orallia* precipitates a condition we could see was in the making. It became clear to some of us who were in contact with your people that the time was approaching when Earth would become less a field of exploration to Irrid than an object of exploitation." Mara made a protesting gesture. "You must admit," Charles went on, "that our anarchic and defenseless society is an almost irresistible temptation."

"But the established colonial policy of Irrid is non-encroachment on existing cultures!"

"Policies change. Besides, there are many types of encroachment; even

contact may be harmful in many ways. Your oldest colony, Irridna, is no great distance from us in terms of galactic distances. Can Earth exist forever as an island in an Irridelian sea? Think of your training in florachemistry. What is the first sign of extinction of a species? Rarity. Rarity precedes death as autumn forebodes winter.

"At any rate, when some of us came to understand these things, we attempted to form a sort of loose organization. We call it the Committee on Extraterrestrial Affairs." The Howards both smiled apologetically; the title had a most ostentatious ring to earthly ears. "The Committee has a number of objectives; one of them is to limit co-operation with Irrid to a degree short of what would be dangerous to Earth."

"Another," added Ruth, "is to prevent the repetition of your captain's discourtesies. If relations are to be continued at all, they will be conducted with mutual delicacy and respect!"

Mara wondered how much of Parran's brusque prejudice had been required to infuriate Ruth. Not much, he decided. The Howards noticed his amused expression.

"I'm just thinking," he explained, "about Parran's reaction when I tell him that he succeeded in alienating a most important government official. He'll be green. The Space Bureau frowns on that sort of thing."

"We will, of course, continue to help all civilian study groups with information concerning florachemical techniques and new plant developments. If any troubles arise in the application of our procedures in your colonies, we are always here to be consulted. For this service we have asked for your help in the colonization of Venus."

"Is that another project of the Committee?"

"Yes. A most painful one." Mara could appreciate, almost as well as a Terrestrial, the wrench of parting from the beloved fields and calm culture of Earth. "We have had to undertake the project to insure against Irridelian colonization of our own system. Venus is too attractive a lure to remain unpeopled." Charles smiled wryly. "We are obliged to your expeditions for information about our sister planet and her history."

Mara raised his unfinished glass: "To Venus. May she become as beautiful as her sister!"

The Howards drank with him. Ruth at this point decided that the discussion had become too somber and began to exert her considerable charms as a hostess; before Mara could remember that he wanted to find out more about this mysterious "Committee," he was well launched into a personal account of his experiences since his last meeting with the Howards. The information that he had acquired a wife caused a small furor.

"Mara and Allele. Blessings!" The Howards toasted him from refilled glasses. The rest of that day took an unexpected turn as Ruth whipped up an unexpected, but seemingly unhurried, reception in honor of his marriage. Throughout the afternoon and evening old friends Mara had known during his years on Earth arrived with greetings and gifts and disappeared with unobtrusive grace. The grateful Mara realized how much he had forgotten of the smooth elegance with which Terrestrials entertained. Ruth kept her fingers on the pulse of the reception and guided the ebb and flow of the happy celebration to the final decrescendo as the last guest left. At the end of it Mara found himself back in his old room with its warm memories.

He lay awake, sleep not coming easily. The result of the excitement of the long, happy day, he thought at first; too bad his visit must end tomorrow. At least there was another whole day. He tried again to sleep and instead found himself actually tossing. What the devil! Here he was back on serene Earth after an exhilarating day and still restless! A sense of something unfinished, something not quite pleasant, possessed him. Not that mess with Parran. No. It was something else. Rarity. "Rarity precedes death as autumn forebodes winter." And again Charles had asked: "Can Earth exist forever as an island in an Irridelian sea?" Those were the

clear consequences that their Committee on Extraterrestrial Affairs must avert. And what had they determined? To colonize Venus and limit co-operation with Irrid to relations of mutual respect, measures that were less than inadequate! Why co-operate at all? There must be other projects and objectives in which this Committee was interested. But what means could be effective against a power with a hundred planetary possessions, a species at the peak of industrial strength, unchallenged throughout the galaxy—

Mara muttered, "I'm thinking like an Irridelian!" Terrestrials wouldn't be impressed by things like that. To them Irrid and Earth would be like two species of plants in free competition in an unbalanced ecology. That's what Charles meant by pointing out that rarity was the first symptom of extinction. That's typical Terrestrial thinking! And how would he go about saving the unsuited species? By setting up an enclave? That's an unhopeful method at best. It would explain Venus, though; that would be the first step in marking off this system as a preserve for man. But that's the island in the Irridelian sea concept that he doesn't believe in. And it wouldn't jibe with continued co-operation and contact.

Why co-operate at all? "I've asked that question before," Mara remembered. "Certainly, the first guess from what I know of Terrestrials, would make me think that our manners

would disgust them to the point of completely ignoring us. If they haven't done so, it must be because they have something to gain themselves. Come to think of it, if they stopped contact they would lose the chance of influencing us at all. That must be it! Earth intends to influence us to our destruction, or at least to the point of rendering us non-dangerous!" Mara was thinking now like an outraged Irridelian. "So they co-operate. What do we get from them? Wine? Fruits? *Poisons?*"

Mara stopped again; this was insane. Apart from the overwhelming reprisals such measures would insure, no Terrestrial could think of resorting to crimes unknown on Earth for centuries. To call a Terrestrial a weed was the last thinkable resort; to call him a murderer was not only unthinkable, but impossible; the very word had died from their language. Well then, what else did Irrid receive from Earth: Florachemistry — the Trees — the Solar Furnace —

Understanding exploded, and with it, relief. That was it, and Mara was willing to bet all he had that he had come up with the right answer. Earth had had an industrial economy once, and abandoned it for the Trees; it was the puzzle that had engaged several Irridelian expeditions. Now that Earth had been told her own history, she was attempting the use of the same method against Irrid. Give Irrid

the Trees and the Solar Furnace and she would forget the stars and live quietly at home in Terrestrial dignity. That was the secret of the Committee. All it failed to realize was that Irrid was past the point where the Trees could make a difference. In fact, her swarming billions would starve and rebel in an economy reduced to the ruralism of Earth. Of course, they could migrate to the colonies, but these were rapidly becoming copies of the mother planet.

— “Of the mother planet?” The thought chilled Mara. Certainly no uninformed observer could look at these children and guess correctly at their parentage. One and all, they were copies not of Irrid, but Earth. Could the Terrestrials, with their intuitive wisdom of growing things, have guessed the answer? “Nonsense,” said Mara to himself, “that part’s just accident. Think of Irrid itself with a Tree growing in Planet Square!” He was soon asleep.

Sleep was a solvent for the restrictions and inhibitions which had blurred his thinking. With these gone a synthesis took place in which Mara’s hopes and hurts played no part. On an unconscious level the process proceeded smoothly to a conclusion which his conscious mind had reached and rejected. Mara dreamed.

He dreamed of Irrid itself, with a Tree growing in Planet Square.

The next day was a dismal one for

Mara. His nightmare refused to wear off and his lingering depression prevented him from fulfilling his objectives on Earth. New developments in Terrestrial flora, instead of awakening his usual enthusiasm in his specialty, inspired long, apprehensive thoughts concerning detrimental effects on Irridelian economy. His efforts to draw the Howards out about the Committee were equally without result. Evidently they had disclosed as much as they thought good for him to know, and the social formality that governed the relationships of guest and host on Earth made it impossible for him to press them further. It was with a sense of relief that Mara made his farewells and boarded the returned *Orallia* that evening.

The interview with Parran was an ordeal. It was impossible for Mara to communicate his vague fears to the literal-minded captain. The information that the captain had offended a representative of Earth’s government in the person of Ruth Howard, left that officer in no happy mood; even less to his taste was the message Mara told him he was commissioned to deliver to the Space Bureau: no more military expeditions to Earth. Parran could guess how kindly his superiors would feel toward the officer responsible for that prohibition. Failing to persuade Mara that such a message, from a possibly unauthorized group, should not be delivered, he dismissed his civilian expert in disgust. At least,

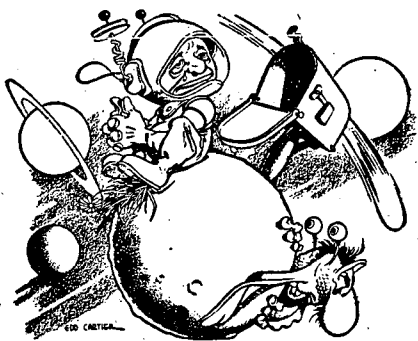
he comforted himself, this ill-starred cruise was practically over. Earth was the last stop; the *Orallia* could go home.

Stellar Spaceport on Irrid was the same mass of regulated confusion Mara remembered; the two Irridelian years since the *Orallia* lifted from the same cradle in which she now lay had only added to the traffic and the congestion. Having wheedled permission from Parran for an overnight leave, Mara now doubted whether the privilege was worth the effort. It meant a race to his apartment and back to the field for early morning conferences with Space Bureau officials with scarcely an hour to spend with Allele, if he found her home at all. The unfamiliar bustle and the distaste for the press of the ubiquitous mobs of Irrid, an aversion renewed by unfamiliarity, combined with his apprehension about tomorrow's conference to produce a state of mind wholly inappropriate for a returning spouse. Luckily he succeeded in getting an air-cab almost at once.

On top of the enormous block within which his apartment cubicle lay, Mara hurried from the cab to the head of the descending shaft. He was intercepted by a call.

"Mara! Mara En Eltra! Just back from your trip?" Bors Loren, a neighbor, hurried up to him beaming.

"Just back, Bors." Mara did not trouble to conceal his impatience.



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"I've only an hour to see Allele."

"She's not staying here now."

Loren smiled as an idea entered his mind. "Don't you know where she is?"

"No." Mara frowned with disappointment. "I'll get her address from the office. Or do you know?"

Loren grinned, savoring the joke.

"She moved and took a house in the country."

"Country?" That was a strange word on Irrid. "Far from here?"

"They reclaimed some industrial waste land and planted it. People who could afford the bill," he smiled knowingly at Mara, "put up some houses there. My flier's on the roof. I could give you a lift."

Mara constrained himself to thank Loren and accept, cursing inwardly at the flying minutes, but the trip was a short one. He was deposited in a wide field. Loren pointed out the road.

"It's the first house, you can't miss it. Allele has had us in to visit a few times."

The road was hardly more than a trail and Mara followed it with difficulty in the dim light. It turned, went over a slight rise and then Mara saw the house.

A sense of utter unreality overcame him. This was Earth. The long trip back to Irrid on the *Orallia* was a dream. As a sleeper whose body wakes while his senses lie still entranced, Mara stood on the low hill looking down at the Tree. Deep within him a foreboding certainty took form and lay submerged, refused by the mind. In a maze, he went down, knocked, and waited.

Waiting, a strange premonition came to him; a notion of how, and in just what words, he would be greeted.

The door opened. It was Allele, flushed with surprise and delight.

But the words were those of another woman, on another planet. It seemed to Mara that he remembered, rather than heard:

"Welcome back, Mara! Welcome back to Irrid and our Tree!"

THE END





THE REFERENCE LIBRARY

BY P. SCHUYLER MILLER

By Way of Introduction

In this year of anthologies it has become increasingly evident that the better of them are put together by men who by background and inclination are thoroughly at home in the field of literature. They can see what is happening in the month-by-month maneuverings of editors and writers in a broader perspective than the average reader, and relate these trends to the structure of our society and the tenor of our times. The result has been that the current crop of science-fiction anthologies has a series of special in-

troductions which are well worth reading for themselves, whatever you may think of the selection of stories in the book.

Introductions of this sort have a way of becoming classic. Dorothy Sayers' for her "The Omnibus of Crime," way back in 1929, may keep her name and reputation green long after Lord Peter Wimsey is forgotten—and it is commended to any reader of ASF who may have missed it, for Miss Sayers incorporated the literature of fantasy and then infant science fiction within the scope of mystery, and traced their origins, as others have

*done since, to the Gothic novels of the late eighteenth and early nineteenth centuries.

Four of the 1951 series of anthologies have introductions which are worth your time. They are the annual "Best Science-Fiction Stories: 1951" edited by Everett F. Bleiler and T. E. Dikty (Fell, \$2.95); Murray Leinster's "Great Stories of Science Fiction" (Random House, \$2.95); Fletcher Pratt's "World of Wonder" (Twayne, \$3.95); and Kendall F. Crossen's "Adventures in Tomorrow" (Greenberg, \$3.50). Murray Leinster, by the way, has thrown in seven pages of recommended stories from all sort of sources, at the end of his book.

Any of these four introductions is worth a full-scale discussion here, for which we obviously can't spare the space. However, a little elimination is possible. In the review of Pratt's collection, his four rules for writing science-fiction were paraphrased. Much of Crossen's "Houyhnhnms & Company" is devoted to an historical review of the evolution of modern s-f, which need not be repeated here. And the Bleiler-Dikty introduction deals with one theme, of which more later.

Although Murray Leinster's own preface, "Let's Call It A Hobby," is thoroughly delightful, the really ambitious introduction to his anthology is by Clifton Fadiman, one-time maestro of "Information Please" and a man who has shown that he knows his science fiction as well as his and any-

one's other books. His, with references to the others, is our text for today.

"As an intelligible statement of the probable, science fiction cannot be defended," Fadiman says. "It is poetry rather than truth . . . a vision dissolving at times into a nightmare or mere fantastic japery. And, like all visions, it does not explain or instruct. It is a form incorporating the fears, the hopes, or the bewilderments of the unconscious." These fears, hopes, and bewilderments, he believes, deal with our relationships with an increasingly mechanized culture—"the Machine," in common parlance.

Can we wholly dismiss the predictive element in science-fiction? Your editor has certainly insisted again and again that we cannot. Kendall Crossen's three-category classification of science fiction provides one, the Method Story, which as he puts it "added the science to science fiction." But there is a growing realization among readers, editors, and, of course, writers that the trend is toward exactly what Clifton Fadiman is talking about—toward stories which deal fundamentally with men's relations to other men, other races, other cultures, *seen, expressed, and evaluated in terms of our own feelings about our own culture and times*. Even in present-day space-opera—Crossen's Class 2, the Romantic Story—these elements are present, and they are the core and being of his third type, the Sociological Story, which Bleiler and Dikty

have developed in other words as an increasing concern with and use of ethnography and anthropology as the background of the best in present-day science fiction.

What does science fiction tell us about the attitudes with which we enter our future? Fletcher Pratt has pointed out that it is particularly well fitted to explore such things, on a down-to-earth level which can at the same time catch the imaginations and stir the thoughts of readers unused to using books for much more than entertainment, and at the same time prod an occasional "intellectual." It has unlimited scope—it is incredibly free from formula—and the process of translating ideas, scientific or philosophic, into plot, character, and action demands of the writer the stiff self-discipline of understanding what he is writing about, instead of merely knowing the language of science.

Other critics of modern literature, in a series of books and articles, see in present-day writing a reflection of the same confusion which Fadiman points out in science fiction. While we cling with deep-rooted superstition to traditional beliefs—astrology, numerology—we try to find in science, or in something which uses the name, an equally disciplined, ordained, unchanging security which sends millions to "magnetic" healers, wonder-drugs, and Velikovsky. We imagine utopian societies in which man has become an enlightened and enlightening empire-

builder among the stars—or we write anti-utopian stories in which uncontrolled science has crushed the last vital spark which separates man from the dinosaurs. We see Science joining in partnership with the Machine to become the ultimate of Frankenstein's tragic monster. We see in man illimitable powers—and doubt his ability to use them without bringing down the universe on his head. And all along there is a literature of pure escape—pure romance—pure space-opera or fantasy—which to the psychologist means that we are trying to camouflage our uncertainty with the present and the future by converting it into pure fairyland, where there is no rational tie to ourselves or our lives.

"A whole literature of dismay cannot arise unless the conditions are there to produce it and the audience is there to digest it," Fadiman points out. This, it seems to me, is a good and encouraging thing, for there is general agreement that the same terms describe the "serious" literature of our times. To me, this testifies to the fact that science fiction is moved by the same forces, answers to the same stimuli, and interprets the same ideas with which our society is most concerned. Stylized and restricted as it may be, it is a part of the main-stream of our times. This is why, as Bleiler and Dikty point out, the best writers are experimenting with anthropological concepts—why Crossen sets up a Sociological type as the most ad-

vanced of his three forms of science fiction.

"In their minor way the less frenzied and more thoughtful writers of science fiction are charging with a new and daring meaning that antique notion of never ending progress to which we now so wistfully look back," Clifton Fadiman concludes. "That such stories should be rather fewer in number than stories of doom or social immobilization is natural enough, our time being what it is: one in which man has gained the power to remold himself nearer to the image of God, without commanding, as these lines are written, the will to do so." That will, working on man himself and on his universe, is the driving power of the best science fiction of our times.

DOUBLE IN SPACE, by Fletcher Pratt.
Doubleday & Co., Garden City.
1951. 217 pp. \$2.75

Rex Stout, almost alone among our leading writers of detective fiction, has had the good sense not to try to blow up a tightly-knit mystery novellette into a flimsily knotted-together "novel." Instead, he has presented his hero, Nero Wolfe, in a series of three-episode books. Now another author-with-a-beard, Fletcher Pratt, has tried the same gambit—and successfully—in the science-fiction field.

A year ago the two stories in this "double" would have been inflated into two books. If anyone could have

done it, Fletcher Pratt could; but he didn't try. And so, between the same covers, you have "Project Excelsior," a spy story of the future in which undercover agents try to sabotage a space-station but love finds a way, and "The Wanderer's Return," a travel yarn of the much farther future whose psychological gimmick, dragging Commodore Lortud and his fleet from planet to bizarre planet through the outer reaches of the Galaxy, will certainly not be revealed by this reviewer.

Undying literature? Colossal concepts? Creative classics? Nope—but it's good reading and good fun, and we hope publishers will go in for more of these double and triple plays, instead of persuading their writers to inflate a good, fast-moving yarn into a shaky book-lengther.

WINE OF THE DREAMERS, by John D. MacDonald. Greenberg: Publisher, New York. 1951. 219 pp. \$2.75

Here is another science-fiction novel which, like several of the publisher's previous books of science fiction and fantasy, has not previously been serialized—and it's good.

Here on Earth a group of scientists headed by Bard Lane and watched over by beautiful psychiatrist Sharon Inly are trying to build the first ship powered by an interstellar drive. Obstacle after obstacle is put in their way, and it begins to appear that they are somehow "possessed" by hostile

hypnosis when the reader learns that the possessing minds are those of a dwindling race of Watchers, stars away across the Galaxy, who believe that the minds they invade telepathically are those of dream creatures of their own invention, and who take childishly—or senilely—cruel delight in smashing these dream-creations when they wake.

How Bard and Sharon learn the truth, and how two of the Dreamers, atavistic Raul Kinson and his sister Leesa, uncover the history of their own bleak planet and their three “dream” worlds and fight against the law of their kind to bring reality out of dreams, is the story. It is well and smoothly told, with likable characters a bit beyond the cardboard stage.

THE IRON STAR, by John Taine. Fantasy Publishing Co., Inc., Los Angeles. 1951. 312 pp. \$3.00

Twenty-one years ago—twenty-two by the time this appears—John Taine’s “Iron Star” was published by Dutton. It was the last of his out-and-out science fiction books, followed only by the reconstruction of life among the dinosaurs in “Before the Dawn” until the specialist publishers recently began to pick up his magazine stories

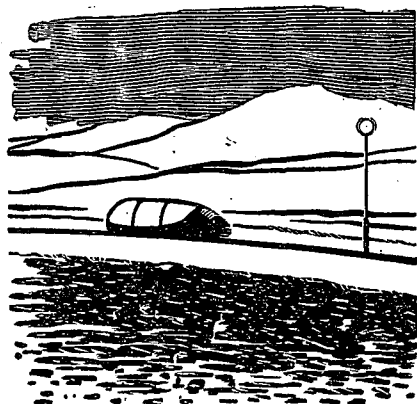
and give them hard covers.

“Iron Star” rates with me as Taine’s greatest book and one of the greatest in all science fiction. In it the elements of daring scientific concept and perplexing mystery, which are the prime characteristics of all Taine’s writing, have been interwoven in just the right proportion and with a smoothness which none of his other books quite show. In it he achieves a really believable and tragic personality in “The Captain,” and carries to its logical conclusion a variation of the startling and disturbing hypothesis of evolution which is also the theme of “Seeds of Life.” It is hard to say more without unraveling the carefully built up mystery of the plot. Remember, by the way, that the story was written before neutrons had been discovered, before fission had been imagined, and at a time when the possibility of trans-uranium elements was pooh-poohed by all or nearly all “responsible” chemists and physicists.

To those who know the book and have been hunting it down at premium prices, the good news is that FPCI has brought it back into print in a reasonably attractive edition. If you don’t know it, here is one classic—no quotes—which you owe yourself the privilege of sampling.

THE END

BY CYRIL JUDD



GUNNER CADE

Second of Three Parts. Gunner Cade was a sincere, and most exceedingly stubborn man. He was loyal to his government—and nothing is more dangerous to a government than making an outlaw of a stubbornly honest man!

Illustrated by Pawelka

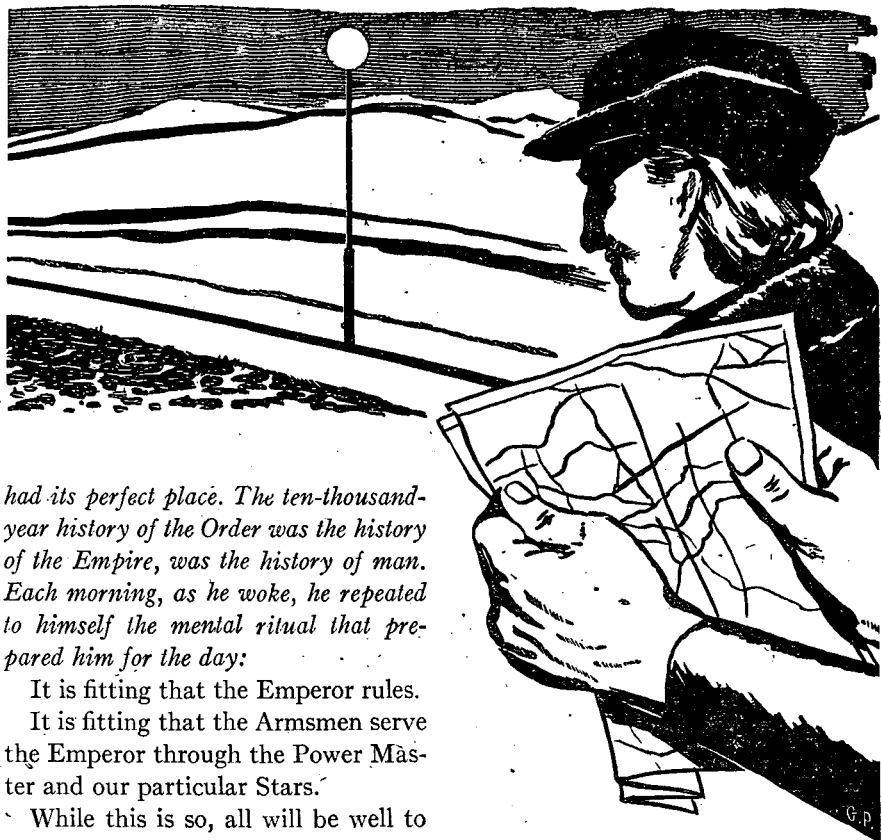
Synopsis

Throughout the Realm of Man—on Earth, Mars, Venus, and the few settled asteroids—Gunner Cade's name was known and his prowess admired. He was one of the youngest company commanders in the Order of Armsmen, with a fabulous history of slaughtered enemies and victorious engagements behind him.

To Cade, however, the adoration of the Commoners was meaningless. He worked, and fought, only to fulfill the vows of poverty, chastity, and obedience

he had taken in the Order. He lived decorously within the meaning of those vows, and meant to die fittingly, within the precepts of the Klin Philosophy. As a child he had learned loyalty to the Emperor and the Power Master. As a youthful Novice in the Denver Chapter House, he had learned devotion to the Gunner Supreme. And as Armiger, and later Gunner of the Order, he had sworn his fealty to the Star of France, the ruler of a large part of central Europe.

For Cade, life was a neatly solved puzzle, in which each perfect section



had its perfect place. The ten-thousand-year history of the Order was the history of the Empire, was the history of man. Each morning, as he woke, he repeated to himself the mental ritual that prepared him for the day:

It is fitting that the Emperor rules.

It is fitting that the Armsmen serve the Emperor through the Power Master and our particular Stars.

While this is so, all will be well to the end of time.

Secure in the ritualistic duties of the Chapter House, Cade knew nothing of the storms that troubled the depths beneath the unruffled surface of the Realm. But after thirteen successful years in the Order, Gunner Cade made his first mistake—he let himself be trapped in the basement of a captured house during an action against the Star of Muscovy's Armsmen.

His captor, strangely, was not a Brother in the Order, but a withered old

hag of a Commoner, whose obvious subservience and helplessness made it possible for her to give the invulnerable Gunner a drink of doped cider.

When Cade regained consciousness, he was in the underground rooms of a Mystery Cult, and, he shortly realized, in the hands of an unbelievable conspiracy against the Emperor himself. He managed one escape from the beautiful Commoner girl who guarded him, only to be recaptured, drugged, and hypno-

tized. Hours later, he was released in a bar in the red-light district of Aberdeen, the capitol city of the Realm. Through his mind a single posthypnotic command was powerfully repeated:

Go to the Palace and kill the Power Master.

All his training, all his instincts, all his loyalties rebelled. But his hands were ready, and his body was eager. Only the unexpected intercession of the girl he had first seen in the Mystery saved him. She appeared again in the bar, dressed as a prostitute of the District, and forced him to drink a fiery fluid that acted as an antidote to the hypnotic drug.

As his head cleared, Cade realized fully the importance of all that had occurred. He left the bar abruptly, determined to make his way to the local Chapter House and tell his story.

Ignoring the warnings of the girl, who would not leave him, he approached a City Watchman, demanding directions to the Chapter House. Not till he found himself being booked for disorderly behavior in the Watch House did he begin to understand the impossibility of obtaining an audience while dressed in the Commoner's clothes with which the Mystery had supplied him. But the immediate problems faded almost into insignificance as he began to understand something even more serious:

The incident in the captured cellar had occurred a full week ago—and the blaster-charged body of "Cade" had been found in the cellar. To the whole

world, he was a dead man!

One night in a cage in the Watch House convinced him that his only hope was to appeal directly to the Order of Armsmen. Only there could his identity be established. In the early hours of the morning, with the assistance of an unbooked Klin Teacher, Fledwick Zisz, who shared his cage, he managed an escape. Together they stole a ground car, and made their way almost to the Chapter House, when they were stopped by a shocking and incredible order issued over the car radio:

"To all Watchmen and Armsmen" the voice said, "this command supercedes the previous all-Watch alert concerning the Cade-impostor and the unbooked Klin Teacher Fledwick Zisz. Both these men are heavily armed and both are dangerous. They are to be shot on sight!"

PART 2

VIII.

"It's a mistake—that's all," Cade said numbly.

"Very well." The little man's voice was acid. "Before we are killed because of this curious mistake will you decide on a course of action? We're still approaching your Brothers' House and I want none of their hospitality."

"You're right," said Cade. "The Brothers," he said, feeling an unwarranted note of apology creeping into his voice, "would obey the official-

frequency command. It's their duty. I would myself, though the command was most—unusual. I don't think I've ever heard its like, not even for the worst criminal."

Fledwick was past his first fury. He studied Cade's bewilderment and said slowly: "Back in the crock I saw you fix the lock and I thought you were either a Gunner or a master burglar—the greatest master I ever heard of. And when you laid out five Watchers without working up a sweat I thought you were either a Gunner or a master burglar and the greatest strongarm bucko I ever saw. But when you tossed away that gas gun because it wasn't fitting, I *knew* you were a Gunner. Cade or not, you're a Gunner. So it's a mistake, but what can we do and where can we go?"

Cade suddenly laughed. The Order was perfect after all; the answer was so easy. He sent the car swinging in a bumpy U-turn over the parkway strips. "To the Gunner Supreme!" he said.

"The Gunner Supreme," echoed Fledwick blankly. "The chief of all the Gunners. Wouldn't he shoot us twice as fast as an ordinary Gunner? I don't understand."

"No, you don't," said Cade. He tried to think of some way to make the wonderful presence clear, knowing he would fail. Of all things in the Order the meaning and being of the Gunner Supreme had most of all to be *felt*. "We in the Order are Brothers,"

he carefully began. "He is the father. The Power Master disposes of us to the several Stars, but the assignment is without force until it has been sealed with the seal that is in the gun hilt of the Gunner Supreme.

"He touches his gun to ours before we first put them on as Armigers. If he didn't touch them we wouldn't be actual members of the Order. The memory of him touching our guns steadies our hands and makes our eyes keen and our wits quick in battle."

And there was more he could never tell to anybody. Those in the Order knew it without telling; those outside would never know. There were the times you didn't like to remember, times when your knees trembled and you sweated advancing into fire. Then you thought of *him*, watching you with concern clouding his brow, and you stopped trembling and sweating. You felt warm and sure advancing into fire to play your fitting part.

"This paragon of Gunners—" began Fledwick ironically.

"Silence, thief! I will not tolerate disrespect."

"I'm sorry . . . may I speak?"

"With decorum."

"You were right to rebuke me." His voice didn't sound quite sincere, but he had, Cade reflected, been through a lot. And, being what he was, he didn't realize that the problem was *solved*—that the Gunner Supreme would understand and everything

would be all-right again.

"Where," Fledwick asked, "does the Gunner Supreme live?"

From beloved ritual Cade quoted the answer: "*Nearby to the Caves of Washington, across the River Potomac to the south, in a mighty Cave that is not a Cave; it is called Alexandria.*"

"The Caves of Washington!" squalled Fledwick. "I'll take my chances with the Watchers. Let me out! Stop the car and let me out!"

"Be still!" Cade yelled at him. "You ought to be ashamed. An educated man like you mouthing the follies of ignorant Commoners. You were a Teacher of Klin, weren't you?"

Fledwick shuddered and subsided for a moment. Then he muttered: "I'm not such a fool. You know yourself it's dangerous. And don't forget, I was born 'an ignorant Commoner.' You sprang it at me before I had time to think, that's all. I felt as if I were a child again, with my mother telling me: 'You be good or I'll take you to the Caves.' I can remember her very words." He shuddered. "How could I forget them?"

"I'll take you to the Caves.

"And the Beetu-Nine will come to tear your fingers and toes off with white-hot knives of metal.

"And the Beetu-Five will come to pepper you with white-hot balls of metal.

"And the Beefai-voh will come and grate your arms and legs with white-hot metal graters.

"And last, if you are not a good boy, the Beethrie-Six will come in the dark and will hunt you out though you run from Cave to Cave in the darkness, screaming. The Beethrie-Six, which lumbers and grumbles, will breathe on you with its poison breath and that is the most horrible of all for your bones will turn to water and you will burn forever."

Fledwick shuddered and was sweating greasily from his forehead. "I'm not a fool," he said belligerently, "but you don't deny there's something about the Caves, do you?"

Cade said shortly: "I wouldn't care to spend a night there, but we're not going to." Fledwick's reminiscence of his mother's threat had shocked him. No wonder, he thought, Commoners were what they were. There was nothing in the Caves—he supposed. One simply, as a matter of course, calmly and rationally avoided the horrible things.

"Alert, all Armsmen and Watchmen!" said the radio. It wasn't the same vibrant, command voice that had issued the "shoot on sight" order, but it was bad news—the bad news Cade had been expecting since then. "The Cade-Impostor and the unbooked Klin Teacher Fledwick Zisz are now known to have stolen Glory of the Realm ground car AB-779. Watchmen are to shoot the occupants of this car on sight with long-range gas guns. When the occupants are paralyzed Watchmen are to take

them with all possible speed to the nearest Chapter House of the Order for immediate execution by Armsmen. Armsmen's orders are unchanged. Shoot to kill; destroy the ground car on sight; kill the occupants if seen outside the car. That is Glory of the Realm ground car AB-779."

The broadcast cut off and the only sound in Glory of the Realm ground car AB-779 was the soft whimpering of Fledwick.

"Keep your nerve, man," Cade urged. "We'll be out of here in a moment." He stopped the car and rummaged through its map case for the Maryland-Virginia sheet and yanked the little crook out bodily. Cade set the car's panel on self-steering at twenty per and opaqued the windows before he started it cityward on the highway.

Standing in the roadside scrub, Fledwick followed the vanishing car with his eyes. "Now what are we going to do?" he asked lymphatically.

"Walk," said Cade grimly. "That way we may live to reach the Supreme. And stop sniveling. There's a good chance that an Armsman will spot the car and burn it without knowing it's empty. And then they won't have an easy time deciding that we got away."

The little man wouldn't stop sobbing.

"See here," said Cade. "If you're going to be like this all the way, it'll be better for both of us if you dig in

somewhere and take care of yourself for a few days while I make it alone."

The unbooked Teacher gave a last tremendous sniff and declared shakily: "No cursed chance of that, Gunner. Lead the way."

Cade led the way across a field for a starter. For the Gunner the five days of overland march were refreshing and reassuring. Here at last was something familiar, something his years of training had fitted him for, something he understood completely. And to his surprise, Fledwick was no burden.

On the first day, for instance, they belly-sneaked up to the chicken yard of a food factory through its great outlying vegetable fields. Cade was suddenly chagrined to discover that he didn't know what to do next. In action, if there was food you demanded it or took it; if there was none you went without. Here there was food—and it would be self-destruction to seize it in his usual fashion. But Fledwick's unusual belt gave up another instrument that sheared easily through the aluminum wire. Fledwick's pockets gave up peas he had picked and shelled along the way, and he scattered a few through the gap in the wire. A few repetitions and there were clucking chickens on their side of the barrier. The little man pounced silently four times and they belly-sneaked back through the vegetable field with a brace of fowl each at their belts.

After that Cade left the commissary to Fledwick, only reminding him that he did not eat meat before sundown and warning him that he wouldn't look kindly on Fledwick devouring a chicken while he chewed carrots.

Once they thought they were in danger of discovery. At an isolated paper mill on the second day they saw Watchmen, a dozen of them, drive up and fan out to beat a field—the wrong one. If they had picked the right one, Cade could have slipped through them with laughable ease, and so perhaps could Fledwick. Cade guessed he would be expert enough at slipping across an unfamiliar room in the dark without betraying himself by squeaks and bumps. From that to a polished job of scouting and patrolling was not as far a cry as he would have thought a few days earlier.

After the incident at the paper mill Cade surrendered to the ex-Teacher's pleading that he be taught the use of the gas gun. Disdainfully, for he still disliked handling the weapon, Cade stripped it a few times, showed Fledwick the correct sight-picture and told him that the rest was practice—necessarily dry-runs, since the number of pellets was limited. Fledwick practiced faithfully for a day, which was enough for the ignoble weapon in Cade's eyes. He went to some pains to explain to the ex-Teacher that gas gun and gun were two entirely different things—that there was a complex symbolism and ceremony about the

gun of the Order which the gas gun, weapon of Commoners, could not claim.

Cade learned as well as taught. In five days, it seemed to him, from the cheerful conversation of the little man he learned more about the world outside the Order than he had learned in the past thirteen years. He knew it was none of his affair to listen as Fledwick told of the life in shops and factories or the uses of restaurants, theaters, entertainment, radio and dives. He consoled himself with occasional self-reminders that he didn't ask—he just listened. And there was a good half that he didn't understand because of linguistic difficulty. Fledwick had a twinned vocabulary. Half of it was respectable and the other half was a lively argot, richly anatomical, whose roots were in a shady world Cade never knew. Here and there a word was inescapably clear because of context.

Less articulate himself, Cade still tried to interpret to the ex-Teacher the meaning that the Order and its life had for him, a Gunner. But he found that although Fledwick sincerely admired the Order, he did so for all the wrong reasons. He seemed incapable of understanding the interior life—the rich complexity of ritual, the appropriateness of each formal thought, the way each Armsman molded his life to Klin. Cade sadly suspected that the ex-Teacher saw the Gunner Su-

preme as a sort of glorified Klin Service Deskman. He could not seem to realize that by *being himself* the Gunner Supreme made the interior life of the Order tangible, that he was the personification of fitness and decorum. But Cade decided he could forgive Fledwick a lot after he snared a plump turkey without a single gobble an hour before sundown.

The third afternoon Cade spent a full hour over his map trying to avoid an inevitable decision. That night he insisted on a march of five kilometers by starlight alone. They woke at dawn, and Fledwick gasped at what he saw to the south.

"Is it—" he asked hoarsely.

"It's the Caves of Washington. Skirting them fairly closely—three kilometers or so—is the only way we can avoid a huge detour around thickly-populated areas. I was afraid you'd balk if you saw them first by daylight." Cade did not add that he had feared he would have balked himself. He cheerily asked: "Did you ever think you'd spend a night this close to the Caves?"

"No," Fledwick shuddered.

They breakfasted on stolen—or requisitioned—fruit while Cade, less calm than he appeared, studied the battered skyline to the south. It was a horrible thing: a rambling mound of gray stone, with black gapings in it like eyes and mouths. Toward the peak there was a thing like the vertebrae of a man's backbone outlined

against the morning sky. It was as though some great, square shaft had toppled and shattered where it struck. It was a horrible thing, and Arle, the Gunner Supreme, lived in a mighty Cave that was not a Cave. In the shadow of Washington, not even the negative was reassuring. Washington was a horror. It made him think of obscenities like firing from a flier. Or the women at Mistress Cannon's.

Cade found himself unable to swallow the fruit pulp. "Let's march," he growled at Fledwick, and the little man scrambled to his feet fast. They skirted the Caves with a generous margin and Fledwick kept up a running stream of nervous chatter—about places like Mistress Cannon's, it happened.

For once, in his nervousness, Cade asked a direct question. Had Fledwick ever heard of a woman wearing the garter who spoke unlike a Commoner and had such-and-such eyes, hair and manner? The ex-Teacher badly misunderstood. He assured Cade that after this mess was cleared up, any time the Gunner was in Aberdeen he could fix him up with the nicest little piece who ever wore the garter and he would personally guarantee that Cade would never notice if she spoke like a Commoner or a starborne—

Cade thundered at him and there was total silence until they reached the shining Potomac.

Fledwick couldn't swim. Cade made him water wings by tying his trouser cuffs, whipping them through the air until they ballooned and drawing the belt tight. He had to push the half-naked little crook into the river and toss the wings to him before he'd believe that the elementary field expedient, trusted by Armsmen for ten thousand years, would work. Cade towed him across and they dried out on the south bank as the Gunner oriented his map.

"That's it," he said, pointing to the East. And he felt covered with dirt for having given a thought to the Commoner girl while he was this close to the Gunner Supreme.

Fledwick only grunted doubtfully. But when ten minutes of brisk walking brought them to a clearer view of the pile he stopped and said flatly: "It's more Caves."

"Oh, you fool!" snapped Cade. "*A mighty Cave that is no Cave*, are the words. And you used to be a Klin Teacher! It obviously means that it looks like a Cave but isn't to be feared like one."

"Obvious to you, perhaps," Fledwick retorted. "But then so many things are perfectly clear to you."

"This is not one of them," the Gunner answered stiffly. "I intend to walk around it at a reasonable distance. Are you coming or aren't you?" Fledwick sat down obstinately and Cade started off to circumnavigate the gloomy, dome-shaped mound that

should be the residence of Arle. It looked like Caves, right enough, on this side—he heard Fledwick pattering after him and declined to notice the little man when he caught up.

They marched around the crumbling dome about three hundred meters from its rim—and it began to assume a shape on its western front that exactly justified the traditional description. The Cave that was no Cave was a gigantic building from one side and a moldering ruin from the other.

"Fives," murmured Cade abstractedly studying it.

"Eh?" asked Fledwick, and the Gunner forgave him for the sake of someone to tell his puzzling discovery to.

"Fives—five floors, five sides, a regular pentagon if it were not half cave, and I think five rings of construction of which we see only the outermost."

"Drop!" snapped Fledwick, and Cade dropped. "Guards," muttered the ex-Teacher. "Armsmen? Watchmen?"

Cade studied the insignificantly small figures against the huge facade.

"Armsmen," he said, heavy-hearted. "We must assume they have received the order to kill us. We will have to wait until night to slip in and bring this before the Gunner Supreme himself. I would trust no one below him."

IX.

They settled themselves in good cover on a grassy mound half a kilometer from the Building of Fives. Fledwick turned face-down and dozed off. The five days had taken a lot out of the city-bred crook, Cade thought, but he'd been a good companion through it all—clever and quick, though no Armsman, useless only when his sharp mind raced ahead of his courage and petrified him with expected terrors.

For Cade there was no sleep. With his eyes trained steadily on the Building of Fives, one part of his mind accumulated and stored the information he needed—the pattern of patrol, the number of guards, time between meetings at sentry posts, the structure of the building and the flesh and bones of the terrain around it. And all the while he pondered the deeper problem he had to solve.

Their chances of getting in were good. Without pride—*pride is a peril*—Cade knew he was among the best of the Emperor's Armsmen, but the necessary feat savored of the impossible. It was too much to expect that he, practically alone, could outwit or overcome a company of sentries. If he failed to pass them and so did not come into the presence of Arle, the Supreme, there had to be a way of getting him the word whether Cade lived or died.

He ripped off a square of his ragged

shirt for writing paper—and there was a flexible little knife Fledwick had casually extracted from his belt and lent him to eat with. A tiny puncture in the middle of each fingertip of his left hand. Then carefully, painfully, one finger at a time, he squeezed the drops of blood out until the friction pads were smeared with red. He pressed each finger to a once-white diamond in the patterned fabric of the shirt.

With a few more drops on the knife point he could write, one letter to a diamond:

CADE DID
NOT DIE
AT
SARRALBE.
CAIRO
MYSTERY
BALTIMORE

That was enough. They could identify the prints, and perhaps even the blood. They could go to the house of the hag who had poisoned him, raid the Mystery with its underground corridors, check on the Watch House's "impostor," piece together the story—a thing he might not live to do.

Cade wiped the blade and his fingers to leave no signs that would puzzle or frighten Fledwick. The ragged cloth from his shirt he knotted about a small stone and dropped in his pocket.

With the last light of the sun the guard was changed at the House of Fives. Cade breathed easier when he saw that the night guard was no

heavier than the day. It was a guard of honor, nothing more. All around the side that was not ruinous paced single sentries on lonely fifty-meter posts, meeting under arc lights, turning to march through the dark until they met at the light marking the other end of the patrol. It was understandable. The staring cave mouths were fearsome enough to need little guarding.

Cade nudged his partner awake with his bare toes, broken through the ruins of Commoners' sandals.

"Is it time?" Fledwick asked.

The Gunner nodded and explained. In two more hours the first alertness of the guards would have worn off and the lassitude of a ceremonial guard mount would be creeping on—not yet strong enough for them to fight against it. Every commander knew that time of night, the time to take green or lazy troops by surprise and teach them a lesson in alertness those who lived would never forget.

They would use their two hours until then to make the approach to the building. Fledwick chewed on a stolen turnip and finally asked: "And then? When we're there?"

Cade pointed to one particular arc light. Behind it, to the right, gaped the black emptiness of a cave mouth, barely distinguishable from shadows the arc lights cast of jagged rock on smoother rock. As they watched two Gunners came in view, approaching with metrical precision from opposite

sides to meet exactly under the light, saluted gun to brow and wheeled and marched off like synchronized puppets.

"Watch *him*," Cade pointed. "The one with the red stripe." Together they watched while the Gunner disappeared again into the blackness and waited until he emerged again, thirty meters beyond, in the brightness of the next sentry post. Here the arc lights showed not gaping ruins but the smooth surface of the building proper. Somewhere in between, invisible, was the junction of ruins and building.

"He's our man," said Cade simply.

"A friend of yours, sir?" asked Fledwick, over-politely.

"He's a Marsman," said Cade, ignoring the flippancy. "The Marsman has not been born who can meet an Earth Gunner in combat and win. Their training is lax and their devotion is lacking. We will take him in the dark, halfway between posts, silently. If we work swiftly and all goes well, I will have time to take his cloak, boots and helmet and make his next round to the sentry post. If there is no time for that, I am afraid we will have to use the . . . gas gun . . . to stun the approaching sentry. Then," he concluded with a shrug, "we have the full pacing time to make our entrance."

Fledwick spat out a fibrous bit of turnip and stared across the field at the sputtering lights. At last he looked up at the Gunner.

"The *full* pacing time? Almost a *whole* minute?"

"Fifty-three seconds. Even you can move that fast," Cade said scornfully.

"You noticed there were bars on the gates—sir?"

Cade was losing his temper. "I noticed," he growled. "I'm not a fool of a Commoner."

"No, sir. I'm very much aware of that. Would you tell a fool of a Commoner how we'll get through the barred gates in fifty-three seconds?"

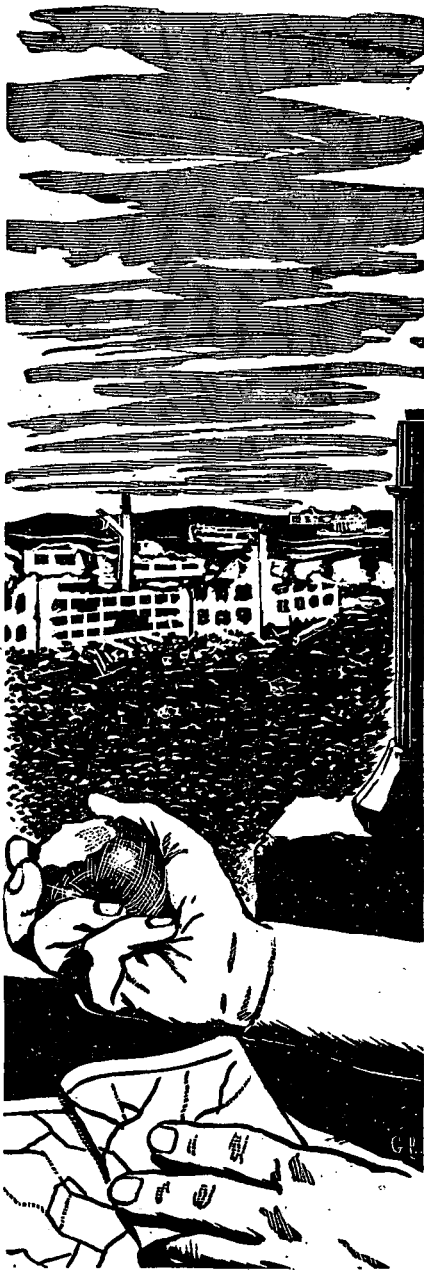
"Serve you right if I didn't. But I can't expect you to show the courage of a Brother. We won't enter the barred gates at all. We'll go through the unbarred cave. It's got to lead into the building. And we're starting now."

He began to work his way down the hillock, ignoring frantic whispers from behind. At last rustling grass and heavy breathing told him that Fledwick was following. He smiled. The noise, he suspected, was to worry him and make him angry. But he knew that when silent sneaking was needed, Fledwick would deliver.

Ten meters down he paused. "You may stay behind if you like," he whispered. "I shall not think ill of you."

He waited in the dark and grinned at a sound between a curse and a sob, followed by more of the rustling and heavy breathing.

"Quiet!" he whispered sternly, and they began the passage.



The full two hours later they crept up to the very edge of the patrol posts and separated. Cade, crouching, thrilled to the awareness of all his muscles tensing for the spring. It was almost disappointingly easy when the split-second came and the Marsman fell silently, perhaps forever, on the concrete path. The neck blow was never certain — either way. Cade had tried not to hit too hard. To kill a Brother in combat was fit and glorious, but never had he heard of any precedent for what he did.

He stripped the silent figure with desperate haste and threw the garments onto himself. Cloak and *the Order wraps the Realm*; Helmet and *cape protects the Emperor*; Boots *march where the Emperor wills*.

But the cursed boots wouldn't fit. He looked up and saw in the distance the opposite sentry approaching, almost in the circle of light. With infinite relief he heard the small hiss of the gas gun and saw the sentry drop, with only one arm in the pool of light beneath the arc. Now Cade no longer needed boots. He buckled on the Marsman's gunbelt and felt sudden wild optimism come with the familiar weight on his hip. He flipped the message-wrapped stone from the pocket of his Commoner's shirt under the cloak and dropped it by the felled Marsman. From somewhere Fledwick crept up beside him and together they raced for the yawning black hole in the ragged wall.

Cade leaped clear of the cave-mouth's jagged edge and found sure footing on the rubble inside. Fledwick couldn't make it. Cade hauled him in, shaking violently and gasping for breath. But Fledwick picked himself up and stumbled after Cade into the deepening darkness of the interior.

They heard voices and tramping boots, and a clear shout: "In here—loose rock—they went *inside!*"

There was anger in the voice, but something else too: awe.

Cade had not let himself think until now of the enormity of this campaign. He had attacked a Brother off the Field of Battle, and perhaps killed him. He had assisted a Commoner, and worse, an unbooked Teacher, into classified ground. If successful, he would invade without request or warning the private dwelling of the Supreme. But somehow overshadowing all this was the realization: *You are in a cave, and you are none the worse for it.*

A blast of hot air rolled through the cave, followed by pungent ozone. "They're shooting into the . . . the cave," he told Fledwick. "Stay down and nothing will happen."

For minutes afterwards the air crackled above them and Cade lay motionless, waiting and hoping to be spared to complete his mission. He thought again of the terrible roster of his crimes, but they had been the only possible answer to crimes worse than he knew could exist. That men

should plot against the Emperor—

The firing stopped. The two or three bends they had rounded were ample protection from the direct effects of the fire, it appeared. Voices echoed down the cave again, and Cade had a mind's eye picture of Gunners peering in cautiously, but never considering pursuit.

... Wasting fire. Get torches—"

... We'll smoke them out—gone inside—"

Cade groped along the floor with one hand and then pulled himself cautiously over to Fledwick. "Get up," he whispered. "We can't stay here."

"I can't," a broken voice whimpered too noisily. "You go ahead."

Wounded, Cade realized—or hurt when they hit the ground. He scooped up the little man and tossed him over his shoulder. He did not groan, Cade noted with surprise and respect. The Gunner started forward.

First, get away from the light. They had food in their pockets, a full-charged gun, a dozen gas-gun pellets and a knife apiece: If they could find a spring for water, a place to put their backs against, they could hold out for a long, long time and perhaps even come out alive.

They turned a corner of some sort that cut off the last light from the entrance. Cade's eyes adjusted to the gloom; he could make out a little of the shape and structure of the cave.

And his eyes confirmed what his feet and groping hands told him. Incredibly, the cave was artificial—a disused corridor in a decayed old building. Cave and Building were one!

What was Washington?

He wished he dared disturb Fledwick, over his shoulder, for the light of his quick, acquisitive intelligence on the finding, but he was taking his injury nobly and shouldn't be taxed further.

The cave—he couldn't think of it as anything else yet—seemed endless; doors were on either side. Any one of the dust-choked rooms might do for a stand, but there was no need to choose one until the sounds of pursuit were heard

On his shoulder the limp bundle wriggled and came alive.

"You can put me down now."

"Can you walk?"

"I think so."

Cade lowered the man to the ground and waited while Fledwick found his footing.

"You mean," the Gunner demanded with as much outrage as he could pack into a whisper, "you're not hurt?"

"I don't *think* so." Fledwick was unashamed. "No, not a scratch."

Cade kept a contemptuous silence.

"Where do we go?" asked Fledwick.

"I think," he said slowly, "if we keep on going we'll find our way to the other part of the building."

"The other part—then you meant

it! And it is part of the building!" The little man darted from one side of the corridor to the other, feeling the regularity of the walls, clutching a door jamb. "But it was a Cave!"

"I told you—a *Cave that is not a Cave*. But you chose to believe in your beasts and horrors and other Commoner's tales. Keep moving." His brusqueness covered a churning confusion in his mind. If the Cave was simply a disused part of a building, why weren't they being followed by the sentries?

They rounded an angle in the corridor—an angle of Fives—and saw at the end of the new corridor, far ahead, a dim rectangle of light, shining like the light around a closed door.

X.

Fledwick redeemed himself.

There was no radionic lock in existence, Cade was certain, that he could not open. But this door was locked in a manner the Gunner had never seen before, with an ancient mechanical device no longer in use anywhere—except among Commoners.

The ex-Teacher seemed perfectly familiar with it. He removed from inside his surprising belt a bit of metal that he twisted in an opening in the lock.

Cade stepped forward first, as was his due. The door opened easily an

inch or two and then, before the Gunner could adjust his eyes to the light, there was a voice.

"Who is it? Who's there?"

Cade almost laughed aloud. He had been ready for a challenge, the blast of a gun, conquest or defeat or even emptiness. He had been ready for almost anything except a startled question in a feminine voice. He pushed the door open and Fledwick followed him into the room.

Only two things were certain about her: she was starborne, a Lady of the Court; and she was just as surprised as he.

She stood erect beside a couch on which, he guessed, she had been resting when the door opened. Her eyes were wide with surprise still, and her garb showed her rank. Only the starborne would or could wear an elaborate coil piled high in soft coils tinted to a perfect match with her subtle blue-green eyes, and scattered with seemingly random drifts of golden dust.

The headdress marked her rank and her clothes confirmed it. She wore the privileged sheer of the nobility, not fashioned obscenely into common pajamas, as he had seen it once, but a fluid draping of cobweb-stuff whose color echoed just a trace of hair and eyes as seafoam carries the faintest vestige of the ocean hue. The same golden specks that dusted her hair were looped in fairy patterns through fabric of the gown, and here and there

where the designer's scheme was to attract the eye of the beholder, the flowing robe was caught and held by artful incrustations of the dust, concealing nothing from the casual gaze but what it made most tempting to see.

Cade stood speechless. He had seen Ladies of the Court in such attire before, though not so close or informally. But the vision itself was responsible for only part of his consternation. It was her presence in the private dwelling of the Gunner Supreme that struck him dumb.

The woman raised a delicately-fashioned tube of gold to her lips and sucked on it. In a small bowl at the other end a coal seemed to glow and when she dropped her hand again a cloud of pale blue smoke came from her lips and drifted lazily across the room to where Cade stood. Its heavy fragrance dizzied him.

"Well?" demanded the woman.

The Gunner formally began: "We come in Klin's service—" and could think of nothing more to say. Something was terribly wrong. Was it possible that he had mistaken the ritual description of the place? Had the slow afternoon of planning and the violence of the night gone for nothing? It seemed, from the furnishings and the woman, to be the palace of a foreign Star. And what could he tell the Lady of such a one?

Fledwick leaped into the breach. Words began to pour from him with practiced ease: "Oh, starborne Lady,

if you have mercy to match even the smallest part of your beauty, hear me before you condemn us out of hand! We are your lowly servants! We throw ourselves at your feet—"

"Silence, fool!" the Gunner growled. "Lady! This Commoner speaks only for himself. I am the servant of no woman but of my Emperor and my Star. Tell me who is the master of this house?"

She scanned him coldly, her eyes lingering on the discrepancies of his gear. "It is enough for you to know that I am its mistress," she said. "I see you wear stolen garments as you speak of loyalty."

There was no possibility at all that she would believe him, but Cade was suddenly and unspeakably weary of subterfuge. "I am no usurper," he said quietly. "I am Gunner Cade of the Order of Armsmen; my Star is the Star of France. They say I died in battle for my Star at Sarralbe, but I did not. I came here for audience with my father in the Order, Gunner Supreme Arle; if you are the mistress here I must have come wrongly. Whatever place this is, I demand assistance in the name of the Order. You will earn the thanks of the Supreme himself if—"

She was laughing a low, throaty chuckle of honest mirth. "So," she said at last, her voice catching to the tag ends of her laughter, "you are Gunner Cade. Then *you*"—she turned

to the little thief—"must be the unbooked Klin Teacher. And to think that you two sorry creatures are the . . . the *dangerous* homicidal maniacs the continent is searching for! How'd you find your way in here? Where did you get those uniforms?" She was a Lady with Commoners; unthinkable that they would not obey if her voice had the proper whip-crack in it.

"The cloak and helmet that I wear are stolen," Cade told her flatly. "I got them less than an hour ago from a sentry at your gate. I also stole—"

"Starborne, have mercy!" shrieked Fledwick abruptly. "I am frightened. I am only a poor thief, but they are right about *him*. Call your master! Quickly! Give us, in his power, starborne Lady, before he—Oh, Lady, *he has a gun!*"

"Stupid!" she chided him, still smiling. "If he has, he can't use it. Do you suppose that an Armsman's gun is such a simple affair that any madman can fire it?" She took a step backward.

"I don't know!" Fledwick shrieked. "I am only a poor thief, but I beg you, starborne Lady, call your master before he kills us both!"

Through this Cade passed rapidly into hurt resentment, anger and, finally, comprehension. The woman was watching him and waiting; he would oblige.

Cade produced his stolen gun from under the cloak with a flourish and aimed it somewhat over Fledwick's

head. "Traitor!" he said loudly. "For this you die!"

The woman's nerve broke at last. She hurled herself across the room to a silk-hung wall and stabbed frantically at a rosette.

"Don't shoot!" wailed Fledwick, winking. "Please don't shoot! I'm only a poor thief—"

While he babbled Cade made a menacing grimace or two and wondered who would turn up. Any Star at all would do. He'd have his gun on him, Fledwick could barricade the place and a message would be sent at last to the Gunner Supreme, with the life of the Star, or whoever was this Lady's master, as hostage for its delivery.

The woman took a hand. "Stop this brawling!" she screamed. Fledwick stopped. Her face was white but proud. "Hear me," she said. "I've summoned—help. If there is bloodshed in my chambers your death is certain. It will not be a pleasant one. But I have a powerful protector." Good; good; thought Cade. The more powerful the better and we'll get this farce over with.

"If you surrender now," the woman went on, fighting for calm, "you will get justice, whatever that may be in your case." She stood composedly, waiting for a gun blast or a plea for mercy.

There was no need to continue playing. Cade holstered the gun; confident that he could out-draw whatever

retainers the master of the place might appear with. Out of admiration for her he swallowed a smile of triumph before he said: "Thank you, Lady. And thank you, Fledwick. You know strategies that I have never been forced to practice."

Mopping his brow Fledwick said from the soul: "I suppose you think I wasn't afraid of that gun?"

"What nonsense is this—?" the woman began indignantly, but she went no further. The door opened and somebody strode into the room.

"Moia!" the man called, seeing only the woman against the silk-hung wall. "What is it? You called—"

He followed her eyes to the two strangers, and they stared back, Fledwick with curiosity and apprehension and Cade with astonishment and veneration. He had automatically drawn the gun. Just as automatically, when he saw the proud, straight head, the gold band on the swirling cloak, the gun with a great seal on its hilt, he performed the Grand Salute of the Order, which is rendered only to the Gunner Supreme.

Abased on the floor, Cade heard the sonorous voice ask with concern: "You are unharmed?"

"Up to now." The Lady's shaky reassurance ended with a forced laugh.

"Good. You may rise, Gunner. Show me your face."

"He's no Gunner!" the woman cried. "He's the Commoner posing as

Cade!"

Calmly the Supreme said: "Donot fear. He is a Gunner, though the cloak he wears is not his own. Speak, Brother. What brings you here in this unseemly manner?"

Cade rose and holstered the gun he had proffered in the salute. With downcast eyes he said: "Sir, I am Gunner Cade of France. I come with an urgent message—"

"I have already received it. A most dramatic message, most dramatically delivered. I was studying it when the Lady Moia's signal reached me. It was your work?"

"Yes, sir. I was not sure I could reach your person alive. Sir, I must warn you that there is a conspiracy, perhaps a dangerously powerful one, against—"

"You will tell me of it shortly. Your . . . the cloak you wear. It seems familiar. Or have you become a Marsman?"

"It was the property of a Brother in your service, sir. I hope I did not kill him. I knew no other way to come to you."

"He is dead. I owe you thanks for that. He guarded an important post and guarded it badly. I shall see to it that a better man replaces him before others less friendly than you find their way to this room." He turned from Cade and addressed the Lady Moia: "We shall leave you now to rest and recover from this upsetting incident. I promise you the guards will be taught

an unforgettable lesson. I will be back when I have heard this Brother's story." Their eyes met and Cade saw them smile, as no Armsman should smile at a woman, and no woman should smile at an Armsman."

"Your story will be better told in my own quarters," Arle said without self-consciousness to Cade. "The Lady Moia's apartment is no place for gory tales." He looked absently about the room until his eyes fell on the open corridor door. "Yes," he muttered, "we must change that lock. You." For the first time he seemed to notice Fledwick. "Close the door and bolt it. There will be a new lock tomorrow, my dear," he added to the Lady Moia. "Meanwhile the bolt will serve. Will you be all right by yourself for a while?" His fingers dipped into a carved gold box on the table and took out a golden smoking pipe, like the one she herself held, and placed it absently between his lips.

"I am all right now," she assured him with sudden nervousness. "You need have no concern for me. The lock may be replaced whenever it is convenient. The pipe, sir!" The Gunner Supreme started. "It's a new plaything of mine," she said, with self-deprecating humor. "I doubt that you would care for it."

Arle took the tube from his lips and studied it as though he had never seen it before. "A strange plaything," he said disapprovingly. "Come along, Gunner. And you too, I suppose."

That was for Fledwick.

The room he took them to was the first reassuring thing Cade had seen in the place. It was a lesson room like those you could find in any Chapter House. The walls were bare, with standard storage space, there was a table in the center and Order benches all around. Cade sat down on Arle's permissive signal; Fledwick remained standing.

"Now," said the Supreme, "let me hear your story."

Cade started. The mad business had gone through his mind so often that it was like a verbatim recitation: doping and capture by a hag in Sarralbe; resurrection in Baltimore; the Cairo Mystery. He had waited so long to tell it and gone through so much for the opportunity that somehow now the whole business was a disappointment. And it seemed there was a final lunatic touch. The Gunner Supreme appeared to be little more interested in hearing the tale than he was in telling it. But he went on, and from time to time Arle asked a question or made a comment: "How many were there? Did they seem to be local people or from overseas? A wicked business, Brother! No recognizable Armsmen, of course?" But his eyes were glazed with boredom.

Could he lie to the incarnate Order? He stumbled in his story; the question burned in his mind, and then the fire went out. He was lying to Arle by

omission. He was leaving out the girl of the Cairo Mystery, who had twice tried, the second time with success, to save him from hypnosis. He let the Gunner Supreme understand that he had automatically come to his senses on the street and then gone on to his arrest—"with some wearer of the garter who was following me"—for impersonating an Armsman. The rest was straightforward, including the attack on the guard and the long trip through the corridor. He told how Fledwick had forced the lock, and the Supreme examined the ex-Teacher's curious key with more interest than he had shown up to that point.

"Very well," he said finally, tossing the key to the table. "And then?"

"Then we entered the . . . the Lady Moia's apartment." Cade choked on the words.

The Lady Moia's apartment. I am its mistress. The Lady Moia rang—and the Gunner Supreme, the incarnation of the Order of Armsmen, came. And quickly! Cade raised his eyes to the fine, proud old face.

"You're troubled, Brother," said the Supreme. "If it will ease your mind, I should tell you that the Lady Moia is one of the graces of this place. Visiting Stars and their Courts are not exposed to the rigors of an Armsman's life in Chapter House. It is the Lady Moia's task to prepare fitting apartments for them and to treat them with the ceremony that I, of course, cannot extend."

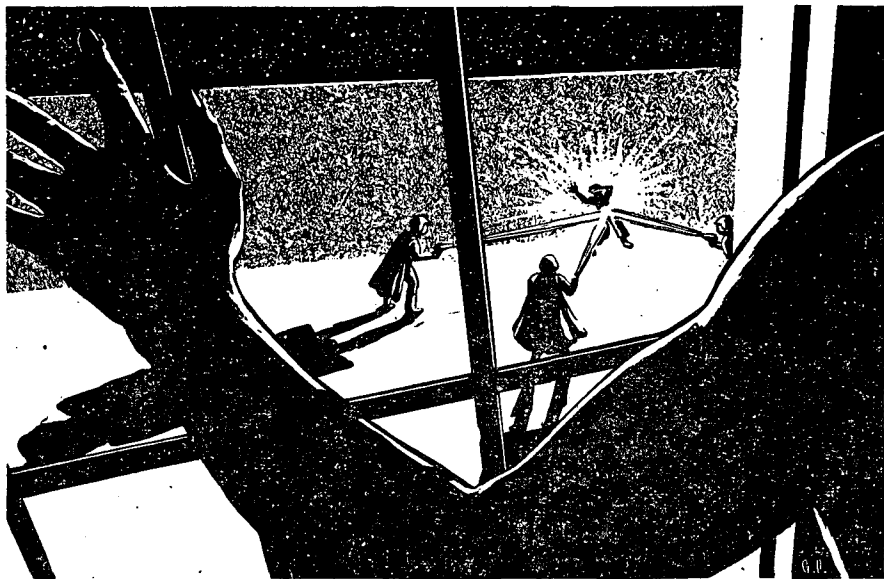
To be sure. It was so sensible. But the smile he had seen was unexplained, and it was unexplained why the Lady Moia, hostess and social aide, could summon the personification of the Order by a push on a concealed button.

His mind a dazed whirl, Cade said hoarsely: "I thank you, sir. There is no more to tell. You know the rest." Then, at a nervous cough from Fledwick, he hastened to emphasize his virtual promise to the little man of a pardon on grounds of service to the Realm.

"Quite right," said the Supreme, and Fledwick relaxed with a sigh.

Three Gunners entered on a summons from Arle. He told them: "This is the former Klin Teacher, Fledwick. You recall that there is an order out to kill him on sight as a homicidal maniac. I find that the order was a gross error. He is a worthy member of the Realm who appears to have committed some trifling indiscretions. Bring me materials for writing him a pardon on grounds of Service."

Cade stole a look at the unbooked Teacher and felt inexplicable shame as Fledwick avoided his eyes. He could not forget the Lady Moia's apartment himself; how could Fledwick? He wished he could take the little man aside to tell him earnestly that it was still all right, that the Supreme's outward forms didn't count; that his inner life must be in complete harmony with Klin, that the relation-



ship between the Supreme and the Lady Moia wasn't—what it obviously was.

Cade sat silently as the Supreme wrote the pardon and signed it in the flowing script that had been on all his own assignments. One of the Gunners dripped a blob of clear thermoplastic on the signature and Arle rapped it smartly with the hilt of his gun. The Seal.

The seal Cade had sometimes in a secret excess of sentimental zeal ritually pressed to his chest, mouth and brow because it had been touched by the gun of the Supreme! He felt himself flushing scarlet, and turned his eyes away. Abruptly he rose, without a permissive sign, and went to Fled-

wick. "You're out of it," he said. "I've kept my promise. You weren't a bad companion."

The little man managed to look directly at him. "It's good of you to say so. And it's been worth it. How I wish I could have taken a picture of your face when I got us those chickens!" It was insolence, but Cade didn't mind. And Fledwick said gently, with that puzzling look Cade had got used to but didn't understand: "I'm sorry."

That was all. The Supreme handed him the pardon and waited impatiently through the little man's lavish protestations of gratitude. "My Gunners here," he said, "will take you in a ground car to Aberdeen. I think

you'll have no trouble with *them* for an escort. There you should present your pardon to the Watch House and that absurd order will be withdrawn. Doubtless you wish to leave at once.

"And you, Gunner," Arle continued. "It's long since you've been in a sleeping loft. He summoned a Novice and ordered: 'Take this Brother to the night guard's sleeping loft. He will need a complete uniform in the morning.'"

Cade performed the abject Grand Salute before he left, and the Gunner-Supreme acknowledged it with an absent-minded nod.

XI.

The empty sleeping loft at least was real and fitting. Cade took a sleepbag from the wall, undressed, belted on his gun and inflated the bag. For weeks he had been thinking that this was the night he would sleep well. Now he knew it would not be so. What had he said to Fledwick? "You're out of it." A puzzling thing for him to say. Cade paced to the window. Five floors below was a courtyard formed by the outer ring of the Building of Fives, the next ring and two connecting spokes. All the many windows on the court were dark, but a thin sliver of new moon showed white concrete down below. It seemed to be an isolated wing. Cade stared down into the moonlit courtyard as though he could hypnotize

himself into numbness.

All right, he told himself angrily. Think about it. Think about the look they exchanged. The bare pretense of interest on the Supreme's face. The absent-minded habitual air with which he picked up the smoking tube. What do you know about it? What do you know except that you're a Gunner, and how to be one?

Maybe that's the way a Gunner Supreme is supposed to be. Maybe they tell you that for your own good, because you're too much of a fool to understand that it's got to be this way because—because of good reasons. Maybe there's a time when they do tell you in secret and show you how it all fits in the Klin Philosophy, like everything else. Maybe the whole thing, from the poisoned cider on down to this sleeping loft was a great secret test of your conduct. What do *you* know about it?

It was too frightening. He recoiled from the brink of such thoughts. They had no business in his head, curse them! He was a Gunner and he knew how to be a Gunner. He tried to think shop-talk, the best kind of talk there is. What kind of duty you had here, how long a tour they gave you, whether there was ever a chance of action or whether it was all ceremony and errands.

Think about the Cave that is not a Cave—a curious place. It made you nervous to think that you had *been* in a Cave and that it had just been a

corridor, without limbering, grumbling beasts prowling its dark lengths. This Building of Fives—had it been created ten thousand years ago like the Caves of Washington, building-half and all? Or had there first been the Caves and then the building built against it? What was wrong with him? He'd have to go to a corrective Teacher if this went on! Was this whirling, churning confusion what lunacy was like?

He crawled into his sleepbag. That at least was good. Some six thousand daily repetitions had formed a powerful habit-pattern. Gratefully he let some of the brief meditations drift soothingly into his mind and across it, ironing out the perplexities. And tomorrow he'd have a proper uniform again. Undersuit, shirt, hose, boots—*where the Emperor wills*—cape, helmet . . . Cade was asleep in the empty loft.

He dreamed of the Gunner Supreme threatening the Lady Moia with a gun, and the Lady Moia turned into the girl of the Cairo Mystery. He tried to explain respectfully to the Supreme that it wasn't the Lady Moia any more and that he had no business shooting her. "Cade!" the girl called faintly. "Cade! Cade!"

The Gunner sat up abruptly. That call was no dream. He ripped open the quick release of his sleepbag and peered through the window into the courtyard. Four figures were dark against the concrete, one of them smaller than the others.

There was some sort of flurry down there and he saw the smaller figure in full, no longer foreshortened. Somebody had fallen or been knocked down. *Fledwick!*

Fledwick got up, expostulating and waving something white, and was knocked down again. He struggled to his feet and held out the white thing with a desperate, pleading gesture, not only in the arm but in every curve of his small, expressive body.

Cade needed no more interpretation of the scene below. It was all there in the little thief's offer of the paper. Cade knew the white scrap was the pardon, written and sealed by the Gunner Supreme. And he saw one of the three other men snatch it impatiently from Fledwick and tear it across.

As if he were remembering the scene instead of seeing it enacted, Cade stood helpless at his window, waiting. He saw Fledwick shoved against a blank wall and saw the other three draw guns. He saw the partner of his five-day march burned down by three guns of the Order, fired simultaneously at low aperture. And last he saw the three remaining figures separate, two to a door in the inner ring, one to a door down below in the building where he himself stood watching.

He was sick, then and there, and after the spasm passed he saw that it was murder—with guns of the Order, wielded by Armsmen at the command of the Gunner Supreme, after

Arle himself had lyingly granted and sealed a pardon.

This was no secret in which he'd be initiated; this was no test of courage or belief. This was lies, treachery and murder at the command of the Order incarnate, the Gunner Supreme.

The door to the loft opened silently and a figure slipped without noise across the floor to Cade's inflated sleeping bag.

"Were you looking for me, Brother?"

The assassin heard the harsh whisper and spun to face the window, gun in hand. He was burned down before he realized his intended victim was not asleep.

Cade's thoughts were crystal-clear and cold. His burned body had been found once before in Sárralbe; it would be found again to buy him precious time until the assassin-Armsman was found missing. He rolled the charred body into the sleepbag he had occupied and burned the flimsy fabric to a cinder with a noiseless discharge at minimum aperture. Presumably anybody within earshot had been alerted for the crash of one lethal blast, but not two.

Cade donned his medley of Commoner's garb and ill-fitting uniform and slipped out the way he had been led, through empty corridors, down empty ramps. The wing seemed to be deserted, and he wondered if it was because it held the apartment of the Lady Moia or because it was where murder was done.

The lock on the inner door to the Lady's apartment was radionic. Cade solved it quickly and slipped through to the cushioned outer chamber. The room was dimly night-lit, still fragrant with the smoke of the golden pipes and the subtler scent that the Lady wore herself. He saw the glitter of golden trinkets on the table—boxes, pipes, things whose use he couldn't guess at—and realized that he had not yet plumbed the depths of the impossible. He was about to become a thief.

He did not know where he was going or how he would get there, but clearly the Houses of the Order were barred to him. For the first time in his life he would need money. Gold, he remembered from childhood, could be exchanged for money, or directly for goods. He reached for the glittering display and filled all his pockets. The sum of trifling metal objects made a surprising weight.

There was a third door to the room, and it stood ajar. He tiptoed across the floor and peered through to the Lady Moia's bedroom. She was alone, asleep, and Cade felt an odd relief, about what he did not know. The beautiful dark head stirred on the white pillow, and he drew back. Unskillfully he worked the mechanical latch of the door to the Cave, nervous at each scratching, clicking sound it made. But in the room beyond the Lady slept on, and at last the door swung open.

When he had come in with Fled-

wick, fleeing through dark corridors at midnight, his terrain-wise eyes had automatically measured and his brain recorded every turn and distance. He was able to retrace his steps and find the Cave opening in a matter of minutes.

The ceremonious patrol was not yet changed. He saw, crossing the Cave-mouth at intervals, a new man instead of the Mars-born Gunner whose cloak was now on Cade's back, but Arle's promise to the frightened Lady had otherwise not been acted on. Clearly, the Gunner Supreme had every confidence in his assassins. Cade stood within the shadow of the Cave-mouth and watched the Gunners on their sentry-go, silhouetted by starlight and arc-light as they met and marched and met again.

The fools! he thought, and then remembered what a prince of fools he was himself, and had been since the day of his decision in his sixth year—until less than an hour ago.

Leaving the Cave-mouth was infinitely easier than entering. This time he knew what waited on the other side — nothing but acres of high grass in which a man could hide forever. *A man*. The thought had come that way, unbidden: *a man*, he had thought; not *a Gunner*.

Cade was only one more shadow between the sputtering lights, a streaking shadow that the routine-fuddled minds of the sentries never saw. Safe

in the tall grass, he lay still for long minutes, until he was certain there had been no alarm. Then, cautiously, he began to inch along, at last, over a decent rise of ground, he rose and walked, heading for the river.

Soon, very soon, he would have to decide where he was going and what he would do. But not now. The shock of the murder and what it meant was too fresh. For now, he knew that Aberdeen and Baltimore were to the north. He was at the Potomac River again in a matter of minutes, but he could not cross by swimming, or even with the aid of water wings like the pair he had made for Fledwick only yesterday. The gold would have weighed him down, and he was stubbornly determined not to abandon it.

He trudged on along the southern bank of the river looking for a log big enough to float him and small enough to steer, or for an unguarded bridge. The first dawn light was creeping into the sky when he heard angry voices over the brow of a knoll. Cade dropped and crawled through the rank grass to listen.

"Easy with it, curse you!"

"You can do better? Do it and shut your mouth!"

"You shut your own mouth. Yell like that and we'll both wind up in the crock on a sump tap."

"I can do a sump tap standing on one foot."

"I hope you have to some day, curse you, if I'm not in on it. I got

better things to do with my time than standing on one foot in the crock for two years."

"Just go easy on the smokers is all I asked—"

Phrases were familiar. "Standing on one foot"—"through a tap in a crock" meant "serving a short prison term with ease." That much he had learned from Fledwick. The talkers were criminals—like him. Cade stood up and saw two Commoners in the hollow below, loading a small raft with flat boxes.

It was a moment before they realized that they were not alone. They saw him on the knoll and stood paralyzed while he strode down on them.

"What're you up to?" he demanded.

"Sir, we're . . . we're —" stammered one. The other had sharper eyes. "Hey!" he said coldly, after studying Cade for a moment. "What is this . . . the shake? You're no Armsman."

"It's not the shake," Cade said. Another one from Fledwick.

"Well, what is it? A man doesn't take a chance on twenty years for nothing. You're in half a uniform and even that doesn't fit. And the gun's a fake if ever I saw one," the Commoner pronounced proudly.

The other was disgusted. "Me falling for a phony uniform and a fake gun! On your way, big fellow. I don't want to know you before you get crocked for twenty."

"I want a ride on your raft. I can

pay." Cade took a gold smoking-pipe box from a pocket. He was about to ask: "Is that enough?" but he saw from their faces that it was, and more. "I also want some Commoner's clothes," he added, and then cursed himself for the betraying "Commoner's"—but they didn't notice.

"Sure," said the man who couldn't be taken in by a fake gun. "We can take you across. But I don't know about clothes."

"I can fix that," the other one said hastily. "You're about my size. I'll be glad to sell what I'm wearing. Of course I ought to get something extra for selling you the blouse off my back—?"

Cade hefted the box. There seemed to be a lot of gold in it, but how much gold was a suit of clothes?

The man took his silence as refusal. "All right," he said, and stripped down to his undersuit. He wasn't nearly as big as Cade, but his clothes were baggy enough to cover him. As Cade methodically transferred his plunder from one set of garments to the other, their eyes bulged.

"You better bury your toy," one of them warned. "A fake gun's the same as impersonating."

"I'll keep it," said Cade, dropping the skirt of his tunic over the gun. "Now get me across."

Watching the last gold ornament disappear, the unbluffable Commoner said tentatively: "We have some more

transportation."

"Hey," said the other.

"Oh, shut your mouth. Can't you tell when a gaff's on the scramble?"

So, Cade reflected, he was a gaff on the scramble, who needed transportation. "What have you got?" he asked.

"Well, my rog, we're on the distribution end for a smoker works. To a gaff that won't sound like much, but a sump tap is a tap same as for gaffing. We get them from . . . from the manufacturer and put them across the river. A ground car picks them up there. The driver could—"

"For two gawdies like that last one," his partner interrupted determinedly, "we'll take you to the driver, vouch for you and tell him to drop you off anywhere along his route."

"One gawdy," said Cade, wondering what a smoker was.

"Done," the friendlier one said promptly. Cade fished for and handed over a box about like the last one. The Commoner caressed it and said: "Let's have a smoker each on the bargain. They'll never miss it." Without waiting for an answer he opened one of the flat boxes on the raft and took three pellets from it. The two Commoners dropped theirs into aluminum tubes, lit up and puffed, and Cade realized at last that smokers went into smoking pipes like those fancied by the Lady Moia.

"Thanks," he said, dropping his pellet into a pocket. "I'll save mine." They gave him a disgusted look and

didn't answer. He realized he had made a more-or-less serious blunder. There were fit and unfit things among Commoners too, and he didn't know how many more unfit things he could get away with.

The pellets lasted only a minute or so, leaving the men relaxed and gently talkative while Cade strained his ears and wits for usable information.

"I smoke too much," one of them said regretfully. "I suppose it's the temptation from handling the stuff."

"It doesn't do you any harm."

"I don't feel right about it. Shoving the stuff's a living, but if the Emperor says we shouldn't, we shouldn't."

"What's the Emperor got to do with it?"

"Well, the first Emperor must have made the sump tables about what you can do and what you can't do."

"Oh, no. The first Emperor and the sump tables were made at the same time. Ask any Teacher."

"You better ask a Teacher yourself . . . but even if the first Emperor and the sump tables did get made at the same time, I wouldn't feel right about it."

"That's what I told my girl. With her it's buy me this and buy me that, and now she wants a sheer dress from a sump shop and I told her even if she got it she couldn't wear it where anybody would see her and even if she wore it in private she wouldn't feel right about it."

"Women," said the other one, shak-

ing his head. "The sump tables are a fine thing for them. Otherwise they'd all be going around like starbornes and you wouldn't have a green in your nick—There's the car. Let's get across."

Cade had seen the blink of lights across the bank. The raft shoved off with Cade sitting on the cases, one man poling and the other, in his underwear, hanging onto the edge. Parked on a highway that paralleled the river bank for a kilometer was a large passenger car of nondescript color and peculiarly dirty identification numbers.

"Who's that?" demanded the driver, joining them. He was a big man run to fat, and had a section of three-centimeter bronze pipe in his fist.

"Gaff on the scramble. A real rog. We said you might drop him along the route."

"*Would, not might,*" Cade said.

"Got troubles enough," said the driver. "Scramble on, duff." Duff was obviously a ripe insult. The driver hefted his bronze pipe hopefully. Cade sighed and flattened him with a medium-hard left into his belly. To the others he said: "Look, you . . . you duffs. Give me back one of those boxes. And if you make any trouble I'll take them both back."

They conferred by glances and handed one of the boxes over. Cade showed it to the driver, who was sitting up and shaking his head dazedly. "This is for you if you drop me off

where I want."

"Sure, rog," the driver said agreeably, "but I can't go off my route, you understand. I can't lose my job for a little extra clink. I got Georgetown, Berwyl, Sandy Spring, Ellicott, Woodstock, Aberdeen, Phoenix, Bel Air, Darlington—"

"Aberdeen," said Cade.

"Sure thing. Now if you'll wait while we load—"

The flat boxes of smokers went into a surprising variety of places in the car—under the seats, inside the cushions, behind removable panels.

Cade watched and wondered why he had chosen Aberdeen, trying to deny that he had chosen it because of the girl. And after a minute he stopped trying. He had to begin somewhere, and she knew something—more than he did. With Fledwick murdered she remained the only person who had not betrayed him at any time since he plunged into the month-long nightmare of conspiracy and disillusion. Besides, he assured himself, it was sound doctrine. The last place they would expect him to go would be the one place he'd been caught before.

Still musing, he sat beside the driver. "Where in Aberdeen?" the man asked when they were on the road.

"You know Mistress Cannon's?"

"Yuh. I deliver there," said the driver, with obvious disapproval.

Cade risked asking: "What's the matter with the place?" It might be a nest of spies.

"Nothing. The old woman's all right. *I* don't care what kind of a dive you go to. I said I'd take you and I will."

Thirteen years of conditioning do not vanish overnight. Cade was guilty and defensive: "I'm looking for somebody. A girl."

"What else? You don't have to tell me about it. I'll take you there, I said. Myself, I'm a family man. I don't go to lectory every day like some people, but I know what's fitting and what isn't."

"You're running smokers!" Cade said indignantly.

"I don't have to feel good about it and maybe I don't. I don't smoke myself. It's not my fault if a lot of ignorant duffs that got born Common can't rest without smoking like a Star and his court. Say 'The Emperor wouldn't like it' and they pull a long face and say 'Oh, it can't matter much and I'll give twice as much to the lectory and the Emperor'll like *that*, won't he?' Fools!"

Cade feebly agreed and the conversation died. As the moralistic evader of the sumptuary laws covered his route, Cade let himself doze off. He knew a man who would keep a bargain once it was made.

XII.

At each start and stop Cade half-opened an eye and went back to sleep again. But finally the driver shook his

shoulder.

Cade woke with a start. Through the window across three feet of sun-splashed, dirty paving he could see stone steps leading down to a heavy door. Ahead another set of steps led up to another hypothetical door out of his vision.

They were in a narrow alley, barely wide enough for the slightly-oversized car. On either side continuous walls of soot-dusted cement rose to a height of three or four stories above the ground. There were no windows, no clearly marked building lines, nothing to mark the one spot from another but dirt and scars on the aging concrete, and the indentations of steps at regular intervals along both sides.

The driver took three neatly-packaged bundles from the arm-rest of the front seat, closed it and held them expectantly.

"Well?" he demanded. "Sitting there all day? Open it."

Cade stiffened, and then made himself relax. He was among Commoners now and would be treated as one himself. It was a lesson he would have to learn as thoroughly as any back in Novice School. His life depended on these lessons, too. "Sorry," he mumbled. "Cannon's?"

"Don't you know it?"

Cade opened the door and muttered: "Looks different by daylight." He followed the driver down the stone steps. The man knocked rhythmically, and the door opened a little. Cade

knew the beefy face at once, but Mistress Cannon did not place him.

Elaborately ignoring the driver, she said hoarsely: "The drinking room doesn't open until nightfall, stranger. Glad to see you then."

The driver said, with interest: "I thought he was a friend of yours. Gaff on the scramble. Some people I know said he's a rog."

Her faded blue eyes swung slowly from Cade's face down his multi-striped clothes to the ragged sandals he still wore, and returned as slowly to his face.

"Seen him before," she admitted at last, grudgingly.

"And my . . . my clinks, too," Cade said quickly. The rest was inspired: "Last time I was here one of your girls took everything you left."

The woman placed him at last. "She was no girl of mine," she insisted defensively.

The driver had had enough. "That'll do," he said. "Fix it up any way you want to between you. I'm behind time now."

The door creaked farther open and Cade followed the driver in.

"You wait here," the woman said to Cade. She led the driver out of the room. It was the kitchen of the establishment. Cade wandered about touching nothing but examining with intense curiosity the unfamiliar miscellany of supplies and equipment.

The big food rooms of Chapter



Houses where Cade had spent hundreds of hours as a Novice were nothing like this place. The single thing he could identify was a giant infra-broiler in one wall; it was identical with those used in the preparation of the evening meat meal in the Houses. But there the similarity ended. Through the transparent doors of the cooler he saw not an orderly procession of joints and roasts but a wild assortment of poultry, fish, meat, and sea food jammed in helter-skelter. Along the opposite wall were more fruits and vegetables than he had known existed—pulpy luxuries, he thought, for degenerate tastes.

There was to be recognized, at last, a cooker designed to mix and warm in one operation the nutritious basic mash on which Armsmen mainly subsisted. But here, instead of being a gleaming, giant structure it was a battered old machine perched on a high shelf almost out of reach. Mash wasn't popular at Cannon's.

On other shelves around the room there were hundreds of bright-faced packages that contained unknown ingredients for use in a dozen or more specialized mixers and heaters whose equal Cade had never seen before. Over it all was an air of cheerful disorder, jumbled but purposeful comfort that struck for Cade a haunting note of reminiscence.

So many things these last few days had stirred old memories: memories of a childhood he had thought was dis-

missed forever when he took his vows. Already, he realized, he was unfitted for the Order. The ritual and routine that had been as much a part of life as breathing had proved itself dispensable. At times it had even seemed like folly. A corrective Teacher, he thought—and then wondered whether he wanted to be corrected. Of course he wanted to get back into the Order, he assured himself. But the Gunner Supreme—

He coldly dismissed his personal tangle of loyalties and prerequisites. The first thing he needed was information, and that meant the girl.

"No girl of mine," Mistress Cannon had said. And long ago: "If you come back, girlie, I may wrap a bar stool around your neck." That didn't matter. He needed a starting point; one well down into the criminal and semi-criminal world in which the girl had seemed to move with assurance. You went from one person to the next in that world: from the smugglers to the driver to Mistress Cannon's. A smile spread over his face. What would he have said not long ago if someone had told him he'd need the good will of a minor crook to gain admission to . . . what did he call it . . . a dive? He, a Gunner among the best?

"Man," said the hoarse voice, "don't smile like that! I'm not as young as I used to be and my shape's run to fat." Mistress Cannon stood in the doorway, grinning. "And he

blushes, too!" she chortled. "Big as a house, built like an Armsman, with a smile that stands your hair on end, and he can blush! Well, we have girls that like 'em that way. Me, I like 'em loaded." There was an abrupt change in her manner. "Lazar says you're on the scramble. What're you carrying?"

He opened his mouth to answer, but didn't have a chance.

"Big fellow, there's plenty rogs before you who spent a day or a month upstairs and no questions asked or answered. No safer place in Eastcoast until . . . trouble . . . blows over. But I can't do it cheap. Lazar brought you in and I like your face myself or I wouldn't do it for all the clink in Aberdeen. You know how protection costs any place and here you get it with a nice room, three meals and all the—"

The woman liked to talk, Cade thought weakly, and let her go on. What she was saying amounted to good luck. He could stay here—and the driver had assumed that this was just what he'd wanted.

The woman stopped for breath, wheezing a little, and Cade seized the chance: "You don't have to worry about money. I'm . . . I'm loaded. I can pay whatever you ask." In all the colorful flow of words, that much had been clear.

"What with?"

He pulled out the first thing his fingers touched in an outer pocket. It was a tiny, glittering piece of jeweled

uselessness, five tiny bells hung on a thin wire loop. It tinkled distantly with almost inaudible music as he put in on a table. The woman's eyes were glued on the golden bauble.

"Practically valueless," she said composedly when she looked up. "Too hard to get rid of."

"I didn't know," Cade said apologetically, reaching for it. "Maybe something else—"

"All right!" she exploded, shaken again by heaves of flabby laughter. "Outbluffed on the first try. You have the other one, of course?" Cade, searching his pockets for a mate to the bauble realized vaguely that he was supposed to have done something clever. He turned out on the table all he had and poked through the mass.

"I'm sorry," he said at last. "It doesn't seem to be here."

The woman looked up dazedly from the array. "You're sorry," she echoed. "It doesn't seem to be here." She looked at him again, searchingly and for a long minute. "What made you come here?" she asked quietly.

"First place I thought of," he said. Something was wrong. What Commoner notion of fitness and unfitness had he violated now?

"Or the only place," she said, musingly. "And don't tell me it was liquor you were out on that other night. Maybe the tart you were with couldn't tell the difference, but I've been around for a lot of years. I know drunk when I see it and I know dope, too. A young-

ster like you . . . well, now I know you're good for your room. But wandering around loaded with gawdies you don't half know the value of . . . didn't anybody ever tell you not to jab up until the job was *through*? And that means selling it after the pick, too."

Cade could make nothing of it. "If you have a room for me," he said patiently, "you'll be well paid. That's all I'm asking from you."

For some reason, she was angry. "Then that's all you'll get! Come on!" She jerked open a door and led the way up dark stairs. To herself she was grumbling: "You can't make a man talk if he doesn't want to, not even to somebody who wants to help. Think they'd have more sense!"

At the stair head she produced a ring of keys like the one Fledwick had used. She opened a door with one and handed it to Cade.

"That's the only one there is," she said. "You're safe up here. If you get hungry or if you get off your perch and want some fun, there's the drinking room."

He closed the door on her and studied his quarters. The room was not light or clean. The shelves in the storage wall were stuck. It didn't matter; there was nothing to store. The bed was an ancient foldable such as he had seen only in Commoners' houses entered during action.

It was hard to remember: he was in

a Commoner's house now, and living as one. He tried the key, locking himself in. He dumped his treasure trove on the cot, fingering the pieces thoughtfully. He hadn't made much of her talk, but her face had shown she was immensely excited over the . . . the gawdies. Or did that just mean boxes? Why had she been excited? They could be exchanged for money, or food. Money could be exchanged for clothes, food, shelter, entertainment. Fledwick had been that way too about money, if he had understood correctly. The little man had habitually run great risk of imprisonment and shame for its sake. And the men on the raft—they had tried to cheat him out of extra gawdies. It all meant that he had something Commoners wanted badly, and a lot of it.

He lay down on the bed and found its pulpy lumps unbearable. The floor was better than the mattress. To find the girl he would have to face the drinking room. Remembering the night he had been there, he remembered the noise, the smells, the drink he had been given, the close air, the foolish women. But the bar was his reason for being there. The girl of the Cairo Mystery had found him there once; there he might find her again. He thought about clothes—he would need some. And boots—slippers, rather. As a Commoner he could not wear boots. And clean clothes. Even a Commoner would not wear the same things all the time, he supposed.

Mistress Cannon anticipated him. She was waiting in the drinking room below with news.

"Wish you'd come down a little sooner. I had old man Carlin hanging around, then he said he had to hit. But he'll be around first thing in the morning. I would've sent him up only I figured you were sleeping the jab off."

Was he supposed to know who old man Carlin was? He asked.

"Carlin? He runs the sump shop around here. Sells court clothes on the side. Though why these tramps will pay such crazy prices for them I don't know. *You aren't from the District, are you?*"

He hesitated, startled by the gunblast question.

"That's what I figured," she said soberly, lowering her voice. "Listen." She bent across the table toward him. "You want some good advice, I can give it to you. Even if you don't want it. You're on the scramble and you jab—a *stinking* combination—and you don't want to get pumped, not by me or any other old bat. Just smile. Don't try to lie when you're jabbed up, and don't get up on a perch like you did with me."

He smiled—at the ridiculous advice and her ridiculous assumption.

"That's it!" she crowed, delightedly. "You're no fool! Hey, Jana!"

A willowy brunette detached herself from a group of girls talking in a

corner while they waited for the place to fill. She walked with studied languor toward them; the silvery garter on her thigh pulled the flimsy stuff of her trousers tight against her at each step.

"Jana, I want you to meet a friend of mine," Mistress Cannon said. "Nothing's too good for my friend, Smiley!" She winked at him, a lewd and terrifying wink as massive as a shrug, and bustled off.

"That's some send-off you got, Smiley," said the girl. Her voice was husky and, quite automatically she assumed the same position Mistress Cannon had.

"Yes," he said stiffly. "She's been very good to me."

"Say, I remember you!" Jana said abruptly. "You were in here last week. And were you troubled, brother! Were you troubled! What's the matter, Smiley?"

He couldn't help it. The shock of being addressed as *brother* in this place by this woman showed on him.

"Nothing," he said.

"Nothing?" she asked wisely. "Listen, I see you're not drinking—" Cade followed her glance and noticed there was a small glass of vile-smelling stuff on the table. He pushed it away. "And I've been arguing with Arlene about it ever since . . . you remember her? The little blonde over there in the corner?" Hope flared wildly, and vanished as he saw the girl she meant. "Anyhow, she says it wasn't

liquor and I say I never saw a man your size, and young like you, out where he sat like you were. Not on liquor. You don't have to tell me if you don't want to, but—?"

She let it linger on a questioning note.

Cade, profiting by his instruction, smiled directly at her, and held the smile until he felt foolish.

The results were unexpected and dramatic. She whistled, a long, low whistle that made half a dozen heads turn their way inquiringly. And she looked at him with such adoration as he had seen only a few times before, from new Armigers on the Field of Battle.

"Bro-ther!" she sighed.

"Excuse me," said Cade in a strangled voice. He ran from the enemy, leaving her in complete and bewildered possession of the field.

XIII.

Cade learned fast at Cannon's. He had to. His eyes and ears, trained for life-or-death differences in action, picked up words, glances and gestures; his battle-sharpened wits evaluated them. He survived.

And Cannon's learned about Cade, as much as was necessary. He was Smiley, and Cannon's etiquette permitted no further prying into his name or rank. He was talked about. Some said he was starborne, but no one asked. His full pockets and Jana's

wagging tongue gave him the introduction and reputation he needed.

His build? He was obviously a strong-arm bucko. His rumored golden trinkets? He was obviously a master gaff — a burglar. His occasional lapses of memory and manners? He was obviously addicted to the most powerful narcotics. That too explained his otherwise inexplicable lack of interest in alcohol and women.

As a bucko and gaff he outranked most other habitués of the place; the ratty little pickpockets, the jumpy gamblers, the thoroughly detestable pimps. As a jabber of unknown drugs he even outranked the friendly, interesting, neatly-dressed confidence men who occasionally passed through. Drugs were a romantic, desperate slap in the face of the world as it was. Mistress Cannon disapproved—there had been a man of hers; she wouldn't talk about it. But to her hostesses it was the ultimate attraction.

Nightly Cade sat in the barroom at a corner table near the stairs with an untasted drink before him. Carlin, who dressed Commoner girls and tramps, secretly in court gowns, had taken his measure and provided him with blues and greens for as much of his plunder as he had chosen to display. The old man had dickered endlessly over each item, but with Mistress Cannon loudly supervising the transaction, Cade emerged with two full sets of clothes built for him, two weeks of exorbitant "board" paid,

and a surplus of clink. In his room, behind one of the stuck storage shelves, he had found a hiding place for his remaining gawdies: one last golden box containing half a dozen smaller trifles.

With this much security—a place to live, new clothes, good food, clink in his pocket, an enviable reputation and a hidden reserve—he could turn his full attention to his quest for the girl of the Cairo Mystery. He asked few questions, but he listened always for a word that might lead to her. Every night he sat at his table, his chair turned to the door, watching every new arrival, buying drink for anyone who would talk—and that was everyone.

First there were Mistress Cannon and her girls. Then he could ask openly after he learned that it was not strange to seek renewal of acquaintance with a girl who had struck one's fancy. But none of them knew her, none remembered seeing her except that night when he had met her there.

It was a setback; but there was no other place to look except Baltimore—and they'd had no trouble handling him there once. If nothing at Cannon's led him to the girl he would act without her, and gradually an alternative plan formed. While it was growing, over the course of his two weeks' stay, he drank in everything he heard from the endless procession of people willing

to talk while Smiley bought.

There was a Marsman who had jumped ship, and taken to liquor and petty thievery. For two nights Cade listened to him curse the misstep: he babbled monotonously about his family and their little iron refinery; how there had been a girl back home and how he might have married and had children to grow up with the planet. The Marsman didn't come back the third night, or ever.

He wasted one night. This was on a quiet, well-spoken, gray-haired man, himself a former gaff who had retired on his "earnings." He came for the first time on Smiley's fourth night in the bar and for almost a week he came again every night. He was a mine of information on criminal ways and means, nicknames, jargon, Watch corruption, organized prostitution, disposal of gaffed goods. On the last night, the wasted night, after chatting and drinking for an hour, he confided without warning that he was in possession of a secret truth unknown to other men. Leaning across the table in excitement he whispered clearly: "Things have not always been as they are now!"

Cade remembered the rites of the Mystery and leaned forward himself to listen. But the hope was illusory; the gentle old man was a lunatic.

He'd found a book, he said, while still gaffing years ago. It was called "Sixth Grade Reader." He thought it was incredibly old, and whispered,

almost in Cade's ear: "More than ten thousand years!"

Cade leaned back in disgust while the madman rattled on. The book was full of stories, verses, anecdotes, many of them supposed to be based on fact and not fiction. But one thing they had in common: not one of them mentioned the Emperor, Klin, the Order, or the Realm of Man. "Don't you see what that means? Can't you see it for yourself? There was a time, once when *there was no Emperor.*"

In the face of Smiley's bored uninterest he lost his caution and spoke loudly enough for Mistress Cannon, at the bar, to catch a word. She stormed to the table in a loyal rage and threw him out. She later regretted it. Word got around and the incident brought on the only Watch raid during Smiley's stay at Cannon's.

The whole district was minutely sifted and Cade, too, had to submit to questioning. But the Watchers were looking for just one man, and Smiley's origin did not concern them. Later, word got to Cannon's that they had found the madman in the very act of airing his mania to jeering children on the street. He did not survive his first night in the Watch House. Those rubber truncheons, Cade remembered, wondered whether it had been necessary to cope with the poor fool so drastically.

There were others who came to the table and talked. One night there was a fat-faced, sententious fellow, a con

man who had hit the skids because of liquor. Smiley bought many drinks for him because he had been in the Cairo Mystery—and several others. He explained that the Mysteries were a good place to meet your johns, and was otherwise defensive. Cade dared to question him closely after the con man had poured down enough liquor to blur his brain and probably leave the incident a blank next morning. But he knew little enough. He'd never heard of hypnosis in connection with a Mystery. A featureless, egg-shaped room had nothing to do with the Cairo rites. Mysteries were strictly for the johns; the revenue from them was strictly for the blades, like him and Smiley. He proposed vaguely that they start a new Mystery with a new twist and take over the other blades' johns. With his experience and Smiley's looks and build it'd be easy. Then he fell asleep across the table.

There were many others, but *she* never came and he never heard a word about her or anybody like her.

When the two weeks he allowed himself were past he knew vastly more than he had known before, but none of it led to the girl. It was time for the other plan.

Mistress Cannon protested hoarsely when he told her he was leaving. "I never saw a man go through a load like that so fast," she complained. "You didn't have to buy for everybody that said he was a rog. Listen—

I made enough on that liquor to cover another week easy. You don't tell anybody about it and I'll let you stay. Two weeks won't do it in this town, but three weeks will. What about it?"

"It's not the money," he tried to explain. She was right about blues and greens being gone, but she didn't know about the box of loot he still had in his room. "There's a job I've got to do. Something I promised before I came here."

"A promise doesn't count when you're hot!" she shouted. "What good will it do to try and keep your promise if you get picked up by the Watchers as soon as you step out of the door?"

He wasn't worried about that. The Cannon grapevine was efficient and he knew the search for the "impostor" Cade had bogged down, at least locally. Two pedestrians had been incinerated by a young Armiger ten days ago. Though a strong order had been put out that identification of the two, as the Cade-impostor and ex-Teacher Zisz was not confirmed as yet, the Watch had naturally slacked off its effort almost to zero locally. If Arle was making any search, it was undercover.

All Cade wanted was a place to leave his few possessions, and that Mistress Cannon could provide. She had a pile of metal boxes in her kitchen that were, under layers of foodstuffs, private vaults with self-set radionic locks.

Cade dressed in his room for the last time in the sober, dignified suit he had specified. Old Carlin had grumbled at the requirements: "Think you're going to Audience?" and Cade had smiled—but that, as a matter of fact, was exactly it: the alternative. The only one:

He could have tried to plunge into the Cairo Mystery and been hypnotized again for his troubles. He could have gone to a Chapter House and been burned down. But there was still, and always, the Emperor.

Even here at Cannon's that much remained. The rogs and blades and hostesses were unfit people but they were loyal, every one. There had been no trace of the conspiracy he sought. The insane burglar with his imaginary book had been an object of horror to them all.

The Realm is wide, thought Cade, but not so wide that the Emperor will turn a deaf ear to any plea.

It was the morning of the monthly Audience Day; he had timed it so. His only fear was that he would not be believed when he told his complex and terrible story. The Emperor's benevolence would be sorely tried to comprehend a plot against him in an innocent Mystery, and also the defection from fitness of the Gunner Supreme. What would he, himself, Cade wondered, have thought of such a tale not long ago?

But it would get to persons less full of loving-kindness than the Em-

peror. He had seen the iron-faced Power Master at ceremonies—a grim tower of a man; the gentle Emperor's mailed fist. Which was as it always had been, which was as it should be. It wasn't hard to visualize the Power Master believing enough of the story to investigate, and that was all that would be needed.

Cade had in his pockets as he left only half the remaining smaller gawdies, three blues and a few greens. Gold box and gun of the Order were in the kitchen behind hardened bronze and under a layer of meal. There was something like a tear in Mistress Cannon's bloodshot eye when she said: "Don't forget you're coming back. There's always a place for you here."

He told her he wouldn't, and it was true. He hoped he would never have to see the place again, but he knew he wouldn't forget it to his dying day. Such—*irregularity*. No order in their lives or thoughts, no proportion, no object, no fitness. And yet there was a curious warmth, an unexpected sense of comradeship like that he felt for Brothers in the Order, but somehow stronger. He wondered if all Commoners had it or if it was the property of only the criminals and near-criminals.

When he closed the door behind him and started down the street he felt strangely alone. It was the same street down which he had walked in the lamplight with the elusive girl following behind. He rounded the cor-

ner where another Watchman now stood and trudged to the Palace in a bitter solitude. What would happen would happen, he gloomily thought, and cursed himself for his gloom. He should have been full of honorable pride and exultation over the service he was about to render to the Emperor, but he was not. Instead he was worried about the Commoner girl. The girl, the girl, the girl! He had lied to the Gunner Supreme by not mentioning her—but only after he half-knew the Supreme was an unfit voluptuary, false to the Order. Hopefully he tried to persuade himself that she would come to no harm; realistically he knew that, harm or not, he could not lie and that she might be caught and crushed in the wheels of justice he soon would set into motion.

XIV.

As a respectable-looking Commoner of the middle class, Cade was admitted without questioning through the Audience Gate, a towering arch in the great wall that enclosed the nerve-center of the Realm. The Palace proper, a graciously-proportioned rose marble building, lay a hundred meters inside. A Klin Serviceman—the gold braid on his gray meant Palace Detail—led the newcomer to a crowd already waiting patiently in the plaza.

"Wait here," he said brusquely, and strode off.

Cade waited as further Commoners

arrived and the crowd began to fill the open square. He noticed, however, that from time to time one of the throng—usually well-dressed—would approach a loitering guard for a few words. Something would seem to change hands and the man or woman would be led off toward the Palace itself.

The Gunner managed to be nearby the next time it happened; he smiled bitterly as his suspicions were confirmed. Even here in the Palace, under the very eyes of the Emperor, there was corruption almost in the open. His time at Cannon's should have prepared him for it.

The next Serviceman to approach the crowd with a newcomer took him inside for the modest price of one green. And he gave Cade what the Gunner took to be complete instructions: "When you enter the Audience Hall, wait for the appearance of the Emperor. After he appears, face him at all times, standing. Keep silent until you're announced. Then, with your eyes lowered, not stepping over the white line, state your case in ten words or so."

"Ten words!"

"Have you no brief, Commoner?" the guard was amazed.

A brief would be a written version of his case. Cade shook his head. "It doesn't matter," he said. "Ten words will be ample."

He turned down the Serviceman's friendly offer to locate a briefsman

who would, of course, require something extra for a rush job. Ten words would be ample; the ones he had in mind would create enough furor to give him all the time he'd need to state his case.

The guard left him finally outside the ornate door of the hall with a last stern order: "Stand right here until they let you in."

"And when is that supposed to be?" a fussily-dressed man at Cade's elbow asked as the Serviceman walked away. "How long a wait *this* time?"

Before Cade could say he didn't know, a white-haired granny scolded: "It doesn't make any difference. It's a real treat, every minute of it. I've been promising myself this trip—I live in Northumberland, that's in England—for many a year and it's a fine thing I finally got the greens for it saved, because I surely won't be here next year!"

"Perhaps not," said the man distantly. And then curiously: "What's your complaint for the Emperor?"

"Complaint? Complaint? Dear me, I have no complaint! I just want to see his kind face close up and say 'Greetings and love from a loyal old lady of Northumberland, England.' Don't you think he'll be pleased?"

Cade melted at her innocence. "I'm sure he will," he said warmly, and she beamed with pleasure.

"I dare say," said the fussily-dressed man. "What I have to lay before the Emperor's justice and wisdom is a

sound grievance—"he whipped out and began to unfold a manuscript of many pages—"against my cursed neighbor Flyte, his slatternly wife and their four destructive brats. I've asked them politely, I've demanded firmly, I've—"

"Pardon." Cade shouldered past the man and seized the old lady from Northumberland by the arm. He had been watching once again the way to get out of a wait-here group. To an expectant Serviceman he said: "Sir, my old mother here is worn from travel. We've been waiting since sun-up. When can we get into the Hall?"

"Why, it might be arranged very soon," the Serviceman said non-committally.

Cade abandoned the effort; apparently there was nothing to do but pay. Bitterly he pulled another green from his pocket. He had just one more after that, and a few blues.

"It's only your old mother you want admitted?" the guard asked kindly. "You yourself wish to wait outside for her?"

Cade understood, wavered a moment and then handed him the last green he owned. It didn't matter. Once in the Hall, in the Emperor's own presence, there could be no more of this.

And he was in the Hall, with the puzzled, grateful old lady from Northumberland beside him, her arm tucked under his.

"Over there," the guard pointed. "And keep your voices low if you must speak."

There were two groups waiting, clearly distinguished from each other. One was composed of Commoners, about fifty of them, nervously congregated behind a white marble line in the oval hall's mosaic flooring. There were perhaps as many persons of rank chatting and strolling relaxedly at a little distance from the Commoners. At the end of the hall was a raised dais where, he supposed, the Emperor would sit. By the dais was a thick pedestal a meter high. Klin guards stood stiffly here and there, with gas guns at their belts. The nearest of them gestured abruptly at Cade, and he hastily moved into the Commoners' enclosure.

Granny was clutching his arm and pouring out twittery thanks. But Cade, already regretting the impulse, turned his back on her and worked his way through to the other side of the group. He was joined a minute later by the overdressed fellow who had talked to him outside the Hall.

"I saw you couldn't persuade the guard," the man said, "so I paid without quibbling. I wonder how many more times the Grays will expect us to pay?"

"That had better be the last," Cade said grimly.

"Such a pity!" someone said from his other side.



"Eh?" Cade turned to see a middle-aged woman, neat as a wasp. She was staring with pursed lips across the Hall at a space near the dais that had been empty only a few minutes ago. It was filling now with starbornes—Ladies, high dignitaries in the Klin Service and a few Brothers of the Order, their cloaks banded with the Silver of Superiors below colored stripes that designated their Stars. Cade studied the stripes and cursed silently: Congo, Pacificsles, California, and of course Eastcoast. He had served under none of them; they would not be able to identify him on the spot. But at the same time they would not half-recognize him, assume he was the Cade-impostor and blast him

where he stood.

"*Such* a trial to the Court!" the woman insisted, pursing her lips and shaking her head with enjoyment.

"What?" asked Cade. She pointed and he realized he had asked the wrong question. "Who?" he amended it, and then he saw—

"*Who's that?*" he demanded, clutching the sleeve of the man next to him.

"What'd you say? Would you mind—this cloth crushes." He picked Cade's hand from his sleeve indignantly, but the Gunner never noticed. It was *she*: he was certain of it. Her back was turned to him and her hair was a brilliant, foolish shade of orange-red to match her gown, but somehow he was certain.

He turned to the wasp: "What about her? Who is she?"

"Don't you know?" She eyed him significantly. "The Lady *Jocelyn*," she whispered. "The peculiar one. You'd never think to look at her that she's a niece of the Emperor himself—"

The fussily-dressed man interrupted with a snickering question to show that he was up on the latest Palace gossip: "The one that writes poems?"

"Yes. And I have a friend who works in the kitchens, not a cook but a dietician, of course, and she says the Lady *Jocelyn* reads them to *everybody*—whether they want to listen or not. Once she even began reciting to some Commoners waiting just like us—"

But Cade was not listening. The Lady *Jocelyn* had turned to face them and her resemblance to the girl of the Mystery collapsed. The bright red hair, of course, was dyed. But even Cade, as little competent to judge women's clothes as any man alive, could see that it was a bad match to a wretchedly-cut gown. She was round-shouldered and evidently near-sighted, for she stood with her head thrust forward like a crane. When she walked off a moment later after surveying the Commoners indifferently, her gait was a foolish sham. If there was any resemblance at all between this awkward misfit of the Court and the vivid, commanding creature who had saved his life, it was only in the nature

of a bad caricature.

All around him there was a sigh and a straightening. The Emperor had come in and was seating himself on the dais. Two Klin guards moved to the Commoners' area and there was a subdued sort of jockeying for position. Before Cade understood what was going on, one of the guards had relieved him of his last few blues, examined the small sum with disgust and stationed him well to the end of the line. Curse it, how much more was he supposed to know that he didn't? He realized that the guard's instructions had not been instructions at all but a last-minute warning which hit only the things he *wasn't* supposed to do: not talk, not turn his back, not overstep the line, not be long-winded—a mere recapitulation of things he was supposed to know. What else was involved? The Commoners he had known at Cannon's were loyal, but shied from the idea of an Audience. He saw plainly from the people he was with that it was a middle-class affair. What else was involved? He was glad he wasn't at the head of the line—and hastily fell into step as the line moved off to stop at the enigmatic pedestal before the dais. Cade saw the fussily-dressed man at the head of the line; he dropped currency—*greens!*—on it and murmured to one of the guards.

Thank offering, love offering, something like that, he vaguely remembered now; much too late to do anything about it. He glowered at the

white-haired granny halfway down the line and berated himself for the impulse that had made him pay her way in. She, canny, middle-class, had saved her money for the offering.

"Commoner Bolwen," the guard was saying, and the fussily-dressed man said to the Emperor, with his eyes lowered: "I present a complaint against a rude and unfit person to my Emperor." He handed his bulky brief to the guard and backed away from the dais.

Not a blue on him, Cade thought, and the line was shortening with amazing efficiency. "Offering," they called it. Did that mean it was voluntary? Nobody was omitting it.

"I ask my Emperor to consider my brilliant son for the Klin Service."

"Loyal greetings to our Emperor from the city of Buena Vista."

"I ask my Emperor's intercession in the bankruptcy case of my husband."

Cade looked up fleetingly at the Emperor's face for possible inspiration, and lost more time. The face was arrestingly different from what he had expected. It was not rapt and unworldly but thoughtful, keen, penetrating—the face of a scholar.

There was a guard at Cade's side, muttering: "Offering in your left hand."

Cade opened his mouth to speak, and the guard said: "Silence."

"But—" said Cade. Instantly the guard's gas gun was out, ready to fire. The guard jerked his head at the

door. He was no moon-faced, sluggish, run-of-the-mill Watchman, Cade saw, but a picked member of the Service; no fighting man but a most efficient guard who could drop him at the hint of a false move. And there were other guards looking their way. Cade silently stepped out of the line and backed to the great door, with the guard's eyes never leaving him.

Outside the Hall the guard delivered a short, withering lecture on Commoners who didn't know their duties and would consume the Emperor's invaluable time as though it were the time of a shop-attendant. Cade gathered that the offering was another of the Commoners' inviolable laws—even stronger than the one that made you use a smoker pellet when it was offered to you. Something as trivial as that, and it had barred him for a month from bringing his case to the Emperor!

The ridiculous injustice of it was suddenly more than he could take. Like a green Brother in battle he choked on despair, with the difference now that there was no Gunner Supreme to shoulder the burden. There was no one, no reason now to carry it at all. He who had dedicated his life and every deed in it to the Emperor was turned away because he didn't have greens to drop into a platter!

The guard was snarling that he had showed disgusting disrespect for the Emperor—

"Respect for the Emperor?" he burst out wildly. "What do you know about it, gray-suited fool? I'm risking my life to be here. There's a conspiracy against the Emperor! I was trying to warn—" His self-pity was cooled by a dash of cold fear. Next he'd be telling his name. Next the gas gun would go off in his face. And then there would be no awakening.

But the gray-clad guard had backed away, his gas gun still firmly trained on Cade's face and his finger white on the trigger. "Conspiracy, is it?" said the guard. "You're mad. Or . . . whatever you are, this is a matter for Armsmen. *Walk.*"

Cade trudged emptily down the corridor. He had said it and he would pay for it. There was an Auxiliary Chapter House in the Palace, and every Armsman would have a description of the Cade-impostor firmly planted in his memory.

"In there." It was an elevator that soared to the top of the Palace and let them out at an anteroom where an Armiger stood guard.

"Sir," said the Klin man, "please call the day's Gunner." The Armiger stared at Cade, and there was no recognition in the stare—a Gunner's trained eye would be another matter. The Armiger spoke into a wall panel and the door opened; Cade was marched through the Ready Room into the Charge Room where the day's Gunner waited.

Instead of a tearing blast of flame

from the charge desk there came a voice—dry, precise, familiar and astonished. "Why, we thought you were—!"

"Silence!" said Cade swiftly. The day's Gunner was Kendall of Denver, a companion for years before his assignment to France. After the first show of surprise, Kendall's long face was impassive. Cade knew his former Brother's mind: form a theory and act on it. By now he would have decided that Cade had been on one of the Order's infrequent secret assignments. And he would never mistake Cade for the hunted Cade-impostor.

"Guard, is there a charge?" Kendall asked, straight-faced.

"Sir, this cursed fellow failed to make the voluntary offering in Audience, he talked in the Emperor's presence, and when I pulled him out of line he yelled about a conspiracy. I suppose he's mad, but if there's anything to it I—"

"Quite right. I'll take charge. Return to your post."

When they were alone, Kendall grinned hugely. "We all thought you were dead, Brother. There's even an order out to kill someone impersonating you. You took a fine chance coming here. We have Brothers Rosso and Banker in the Palace detail besides me; they'll be glad to hear the news. How may I help you?"

Escort to the Emperor? No; now the Emperor need not be troubled with it. The Emperor's right arm

would set this crazy muddle right. "Take me to the Power Master, Brother. At once."

Kendall led the way without question. Through corridors, down ramps, through antechambers, Cade happily saw doors open and salutes snap to the trim uniform of the Gunner.

They came to a great apartment at last that was far from ornate. There was an antechamber where men and women sat and waited. There was a brightly lit, vast communications room behind that where hundreds of youngsters tended solid banks of sending and receiving signal units. There was a great room behind that where men at long tables elaborated outgoing messages and briefed incoming ones. There were many, many smaller rooms behind that where older men could be seen talking into dictating machines or writing, and consulting lists and folders as they worked. Endlessly, messengers went to and fro.

Cade let none of the wonder he felt show on his face. It was his first glimpse of the complex machinery of administration.

In a final anteroom, alone, they sat and waited. Cade felt the eerie sensation of being spy-rayed, but the orifice was too cunningly concealed for him to spot it.

"Gunner Kendall, come in and bring the Commoner," said a voice at length—and Cade stiffened. It was the same vibrant, commanding voice

he would never forget, the voice which had given the "kill-on-sight" command for him and Fledwick.

He followed Kendall from the anteroom into a place whose like he had never seen before. It had every comfort of the Lady Moia's bedchamber, but was grimly masculine and unadorned. The whole room pointed to a table where the iron-visaged Power Master sat, and Cade rejoiced. This was the man who would crush the conspiracy and root out the decadent Gunner Supreme—

"Sir," said Kendall in his precise way, "this is Gunner Cade, mistakenly supposed dead. He asked me to bring him to you."

"My spy ray showed me that he is unarmed," said the Power Master. "See to it that he does not seize your weapon." He got up from the table as Kendall backed away from Cade, with confusion on his face. Cade saw that the Power Master wore a gun of the Order—a gun he deliberately unbuckled and flung on the table with a crash. Slowly he approached Cade.

The man was fully as tall as Cade, and heavier. His muscles were rock-hard knots where Cade's were sliding steel bands. Cade was a boxer, the Power Master—a strangler. With his face half a meter from Cade's, he said, in the voice that once had ordered his death: "Are you going to kill me, Gunner? This is your chance."

Cade told him steadily: "I am not here to kill you, sir. I'm here to give

you information vital to the Realm."

The Power Master stared into his eyes for a long, silent minute, and then suddenly grinned. He returned to the table to buckle on his gun. "You're sure he's Cade?" he asked, with his back turned.

"No possible doubt, sir," said Kendall. "We were Novices together."

"Cade, who else knows about this?"

"Nobody, sir. Only Brother Kendall."

"Good." The Power Master swung around with the gun in his hand. A stab of flame from it blasted the life out of Gunner Kendall. Cade saw the muzzle of the gun trained steadily on him as Kendall toppled to the floor.

TO BE CONCLUDED

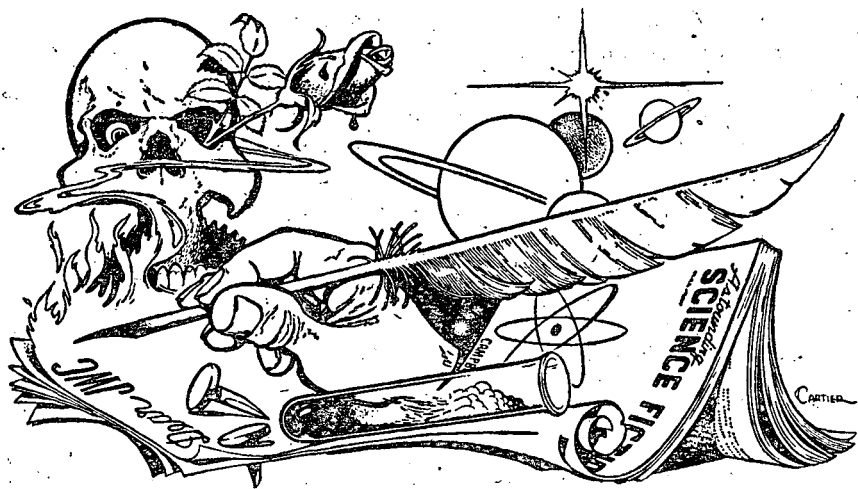
MECHANICAL MICE

Some years back, we ran a yarn about the Mechanical Mice; currently Claude Shannon of the Bell Telephone Laboratories is experimenting with making a mechanical mouse. In its present form, the visible arrangement is a mouse-sized gadget that scurries busily around the intricacies of a maze made of sheet aluminum walls and small metal posts, about three inches high, built on a boxlike structure about two and one half feet square. The mouse-size gadget is actually manipulated by this environment, rather than in the usual order of procedure; the box contains the motors, switches and relay-computer that make the "mouse" work; the mouse is simply an alnico magnet bar carrying an electrical contact.

But the "mouse" demonstrates the ability of the computer to seek for a solution, by testing its environment, and by following a "search strategy". The solution is "memorized," and the "mouse" can retrace the solution so learned. If placed in a part of the maze it has not previously entered, it will revert to search strategy until it enters a section of the maze it already "knows," whereupon it heads directly for the goal.

With certain arrangements of the movable walls, the "mouse" will be led by its search strategy to circle around and around without getting anywhere—for a while. The mouse, however, has a built-in "discouragement circuit"; if it has entered twenty-five squares without reaching the goal, the discouragement circuit cuts in, and changes its method of searching. There are only twenty-five squares in the total maze, so it's quite easy to determine how many efforts prove the method of search is inappropriate to the problem; Man's efforts to determine what constitutes proper grounds for discouragement are up against a somewhat tougher problem.

Shannon's work is quite meaningful; the "mouse" actually demonstrates a computer that programs itself, follows a complex routine to an end-point not known at the start, then switches its own program. The discouragement circuit represents a circuit which will change the computer's program if, after a predetermined number of steps, the desired degree of progress has not been made.



BRASS TACKS

Dear Mr. Campbell:

I wish to direct a belated protest at Mr. Ley's article on "Meteorite Craters" which appeared in your September issue. Mr. Ley repeats an unfortunate mistake which found its way into the early popular descriptions of Meteor Crater by stating that there is "no present or past vulcanism for a long distance around." Sunset Crater, east of Flagstaff, is hardly thirty miles away, and it was almost certainly active a few thousand years ago when Meteor Crater was formed. Not that any geologist would today argue that the crater is volcanic, but in Gilbert's time that explanation was more reasonable than Ley's criti-

cism would suggest. There may well be other volcanoes closer than Sunset Crater, I mention it only because I happen to know it is of the proper age. My sister, Dr. Frederica de Laguna, an archaeologist, has used the widespread thin ash layers from it to help date ancient Indian village sites she has excavated nearby. There are much larger volcanoes, the San Francisco Peaks, just north of Flagstaff, but they had been burned out and dead for thousands of years when Meteor Crater was formed.

A more important but more subtle reason for G. K. Gilbert's mistake is to be found in the fundamental teachings of geology. This science got off

to a slow start because the early students tried to explain so many earth features as the result of sudden cataclysms, which had taken place in the past, but which are not now to be seen anywhere. Aristotle, for example, taught that where rivers flowed through mountain canyons, the earth had split open and so formed a path for the river. Much later the story of Genesis in the Bible was interpreted as demanding a maximum age of Earth of not over six thousand years. With so little time available for the formation of mountains, valleys, river deltas—and fossils—appeal to past cataclysms, deluges, upheavals and other sudden and sensational transformations was necessary. Thomas Burnet's "Sacred Theory of the Earth" published in 1681 is typical of the floundering that resulted from an explanation of Earth based on a chaotic sequence of sudden mysterious changes.

Geology as a science dated from the publication in 1795 of James Hutton's "Theory of The Earth, with Proofs and Illustrations"—or rather, since Hutton, unlike most geologists, wrote in a ponderous and boring style, from John Playfair's beautifully written "Illustrations of the Huttonian Theory" published in 1802. The basis and backbone of the new philosophy was that the present is the key to the past, and that one must interpret the past "by what can be seen of the present order of nature; and one must

refuse to admit the operation of causes which cannot be shown to be part of the actual terrestrial system." Firm adherence to this basic principle, plus, one must add, a lot of hard work and patient observation, liberated the science of geology from the barren speculations of the past, and built a picture of our world and of its origin which guides the mining of the world's ores and fuels, finds its water supplies, and provides the foundation for all of the more ambitious works of the construction engineer. Modern textbooks, as for example "Geology," by Emmons, Thiel, Stauffer and Allison still admonish the reader that "the geologic history of Earth should be interpreted in the light of the processes that are observed to be operating on Earth today." Gilbert must have absorbed this teaching with his first application of shaving soap.

So picture him then, not yet a hundred years after Playfair, standing on the rim of Coon Butte, and with the volcanoes of the Flagstaff area clearly silhouetted against the western sunset, and concerned with the origin of an obvious explosion crater. How could he appeal to a visitation from the heavens, an at that time unheard-of cause, with the voice of successful precedent ringing in his ears that "one must refuse to admit the operation of causes which cannot be shown to be part of the actual terrestrial system?" Gilbert was an able and brilliant man, and was gifted with a

practical imagination, as his peculiarly clear and easily read scientific papers will show, but he was the prisoner of his teachers and his times. We should see in his mistake not "an extraordinary potent example of inconspicuous incompetence" as Willy Ley suggests, but a warning to us to guard against the compunction to deny any exceptions, even of the most successful and widely proven laws of science, lest we, too, fail to recognize a "visitor from outer space." Surely this moral is one which should be acceptable to Science Fiction.—Wallace de Laguna, Geologist, U. S. Geological Survey, Assigned, Brookhaven National Laboratory.

It would take something as violent as meteors, volcanoes, and may be grazing a planetoid or two to shape old Earth in six thousand years!

Dear Campbell:

A great deal has been written in ASF lately about the difficulty of relations between very different cultures, each side appearing mad to the other. It might be well to mention that there is an area of agreement. One may be absolutely mad, in any time or place, a condition we will call insanity. One may also be relatively mad, or unfitted to the culture, and we will call this maladjustment.

The difference is best seen in an illustration. Suppose a man should

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dislike sidewalks and take to walking about a large city in the middle of the streets. If his purpose is to get across town fairly soon and in good condition, he is either insane or very stupid. His methods are not well adapted to the desired ends. A cannibal or a Martian would agree perfectly with this judgment. The insane nature of his proceedings will shortly be demonstrated objectively when he is run down or arrested, thus failing to attain the results desired.

On the other hand our jaywalker may have other motives besides the simple desire to reach his objective across town. Suppose he decides that the thrill of a near-miss compensates him for the risk of death or injury. This is a subjective judgment of value, not subject to any logical argument. He is merely maladjusted because his values do not match those of his community. It may not be much comfort to the victim to be only relatively mad. He will still have to be put away behind bars if he cannot be persuaded to give up his pastime.

In this type of madness there will be no agreement between different cultural groups. The jaywalker may be admired for his "nerve" by some daredevils and the like. In different circumstances he might make a very useful fighter pilot. If transferred to the Masai he would rise to the highest rank if he lived long enough, for they admire pointless courage.

It is interesting to look at the hu-

man race as a whole from this point of view. Over the last fifty years the general mass of us have been seeking peace, freedom, and economic well being. The methods used have brought steadily increasing destruction, insecurity, and bureaucratic control. There is clearly something wrong.

Some explain the discrepancy by the theory that we are sharing the world with a sub-race of fiends in human form whose greatest pleasure is to thwart the desires of the rest of us. This theory is hard to maintain at best, and has become hopeless lately due to confusion in identifying the fiends. One group of them is overthrown; so our loyal allies instantly replace them and the ex-fiends commonly become our friends and allies.

Further, we have not gone wrong from stupidity, because we have shown wonderful intelligence on such things as power networks and television circuits, which are not obscured by emotion. The only remaining conclusion is that the human race is quite insane.—William H. Clark, Box 144, Station I, Canyon, Texas.

Well—you know a human being tends to seek an environmental situation with which he is familiar. The "home-like atmosphere" sort of thing. Maybe, after seven thousand years of recorded history of war, rape and slaughter, we're just seeking a home-like atmosphere? After all, the un-

ASTOUNDING SCIENCE-FICTION

familiar, the unknown, is always fearsome, and prolonged peace is certainly the great unknown.

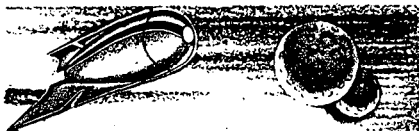
Dear Mr. Campbell:

Your prophecy in the November '51 issue, concerning the extended neck of Mr. Richard Hubler, is quite correct as far as I am concerned, although more than a few "raging lions" probably will be heard from.

There are so many things in Mr. Hubler's letter that I consider mistaken that I don't know at what point to start my criticism. Oh, well, I might as well start at the point where he says that not all scientists are men of high intelligence. (By a "scientist" I mean an actual research man and not a lab technician who does nothing but follow orders.)

One of the qualities which is absolutely necessary in a scientist is the ability to correlate observed data with previously acquired knowledge. The previously acquired knowledge might possibly be obtained by a man of low intelligence, providing he had an exceptional memory, but the correlation of that knowledge with hitherto unknown facts to obtain a new theory is something which requires a high intelligence.

Mr. Hubler is correct, I believe, when he asserts that to be a scientist it is usually necessary to have a college education. But he is wrong when he states that the necessity for a college



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education eliminates seventy-five per cent of the population. I am carrying out a course of study at the present time at the Illinois Institute of Technology, and feel well qualified to comment on the financial position of technical students. The majority of the students at IIT are not rolling in wealth as Mr. Hubler would have you believe. There are a large number of scholarships available to anyone who has the intelligence to pass a competitive examination. Aside from the scholarships, many large industrial firms offer "co-op" plans, whereby a student can work for a year and study a year, with the help of the firm. When a B.S. degree has been acquired, there are scholarships, fellowships and co-op plans for graduate students. Intelligence and an honest desire to learn are the only two things really needed to get a college education.

In reference to the "... routine which is devoted largely to memorization rather than genuine creative training ..." which Mr. Hubler mentions, I can only say: How can a man explore the mysteries of science unless he has a background of higher mathematics, chemistry, physics, et cetera, to help him find his way?

In regard to the next paragraph of Mr. Hubler's letter, dealing with the rationality of scientists, I can point out such men as Dr. Vannevar Bush, who was director of scientific research for the United States government during the last war. There are many

such men as Dr. Bush, who have proved themselves quite capable of "reasonable, rational and judicious" thinking.

I shall skip over the next paragraph in Mr. Hubler's letter, as it contains no discernible logic to refute.

I believe that in the sense Mr. Hubler uses "truth" and "wisdom" those two words are synonymous. (Call in a semantics expert to settle that.)

I would like to ask Mr. Hubler how he came to the conclusion that scientists are inhuman. I see no justification for that statement whatsoever.

I grant that the nonspecialized technician is necessary, as Mr. Hubler implies, but specialists are also necessary if any progress is to be made. It is not humanly impossible for one individual to know enough about every field of science to do detailed research in any one of them.

But enough of criticism. I find that I have enough paper left to devote some space to praise. The praise, however, is for ASF, and not for Mr. Hubler. I could write pages and pages telling you what I think of your magazine, but I shall boil it down to one sentence.

You have a damn good magazine.
—James Springer, 9212 So. Peoria Street, Chicago 20, Illinois.

I have a feeling it would clear the air a lot, and aid discussion, if we had a good definition of "scientist."

G. D. KROUSE, 822 Greene St., Augusta, Georgia, U.S.A.

but so can any other student.

Of course, everyone isn't a veteran. On most college campuses there are numerous jobs a student can take to pay part or all of his way. It may take a little longer to reach a degree that way, but it certainly can be done.

The graduate student in the sciences has a good chance of obtaining an assistantship at most grad schools. This generally pays his tuition plus one hundred to one hundred fifty dollars a month. Most graduate assistants I've known expect no help from home.

In my own case my father and the VA have backed me to the extent of eight thousand dollars. Over the seven years, during which I've always earned some of my own way, this is eleven hundred forty dollars per year. My wife's history is even more to the point: Carrying a full load she worked half-time in a college office, graduated in three years second in her class. She had just two assets, intelligence and determination.

Mr. Hubler's six-thousand-dollars-a-year student is both a loafer and a spendthrift. Two thousand dollars is plenty; fifteen hundred is sufficient. For the student with initiative and brains, the loan of his initial tuition will do.—Brad Thompson, 923B Walnut Lane, East Lansing, Michigan.

In any field, on any subject, the real authority is the man who is doing the job, and making it work successfully. An Authority has spoken!

Dear John:

Re Mr. Newton's remarks on a definition of science fiction: There are two kinds of definition, that of the descriptive type which aims to give the reader information about a group of real things, and that of the legalistic type which tries to establish the precise coverage that it is desired to attribute to a particular term. —

We might call definitions of the first type "nuclear" and those of the second "perimetric," though I suppose that logicians have better terms. A nuclear-descriptive definition starts with, or implies that it starts with, a clause something like: "There exists a group of objects, commonly called X's, which it is convenient to consider as a natural class, and which are distinguished by possessing most or all of the following common attributes." A definition of the perimetric-legalistic type contrariwise implies an introduction like: "For the purposes in hand, the term X shall include all objects having the following attributes, and those only." (In the latter case the definition may be valid even though the objects do not exist.)

The trouble is that most definers shoot off a definition without considering which type it belongs to, and then wonder why they get into semantic difficulties. For instance Dr. Brauner's definition looks pretty good until one reflects that it would include Sinclair Lewis' "Arrowsmith," which deals with the impact on man of a

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science—medicine—but which would certainly not be deemed science fiction by most aficionados of the genre.

Actually the perimetric definition is of little use save in special fields like law and patents where the boundaries are more important than what lies within them. It is not hard, however, to work up valid nuclear definitions of science fiction and its sister fantasy. They go like this:

"In the fiction of the modern Western world, there is a group of stories, nonrealistic, imaginative, based upon assumptions contrary to everyday experience, often highly fanciful and often laid in settings remote in time or space from those of everyday life. These stories may be called 'imaginative fiction.' Imaginative fiction in turn falls into two fairly distinct sub-classes: *fantasy*, comprising stories based upon supernaturalistic assumptions—spirits, magic, prophecy, et

cetera—and *science fiction*, based upon scientific or pseudoscientific assumptions—space travel, telepathy, immortality, et cetera. Occasional stories fall between the two sub-classes or embody the attributes of both—e.g. C. L. Moore's celebrated Northwest Smith stories—and the genre as a whole shades off into historical fiction, lost-race adventure-stories, et cetera.

There you are. But why the term "pseudoscientific?" Well, there are many stories based, not upon supernatural assumptions, but upon assumptions still contrary to what are generally considered established facts, such as stories of time travel, or stories assuming space travel faster than light. But as these stories seem much less distinct from the "purer" science-fiction stories than from fantasies—as defined above—it seems expedient to lump them into the science-fiction class.



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I don't think the question of whether a story deals *primarily* with the impact of science is relevant for purposes of definition. A story mainly concerned with that impact may be science fiction, but so may a story that is primarily social satire, cloak-and-sword adventure, slapstick comedy, or an analysis of human relationships. While there is nothing epistemologically wrong with Dr. Brauner's definition, it simply does not reflect a distinction that most writers, editors, and readers of imaginative fiction have drawn in practice during the recent decades when the genre has flourished.

Nor can I concede the distinction that you recently set up in a letter to me, between science fiction and fantasy, by saying that a science-fiction story is one that the author believes to be possible, while a fantasy is one that he doesn't. As far as this writer is concerned, that definition automatically puts all stories of time travel, space travel faster than light, parallel worlds, telepathy, Atlantis, matter transmission, and several other common story elements into the fantasy field, for I regard these elements as either impossible or extremely unlikely.—L. Sprague de Camp, Wallingford, Pennsylvania.

My definition, however, said "the" author—not "an" author. For you, time travel may indeed be fantasy while for Bob Heinlein it is not.

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True Detective Mysteries

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Nick Carter

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